ESLINX

AV CONTROL SYSTEM

USER GUIDE

[part no. I357GB issue 2]

ESLINX User Guide
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Issued by:

Publications Department,
Electrosonic Ltd.,
Hawley Mill,
Hawley Road,
Dartford,
Kent,
DA2 7SY,
United Kingdom.

Documentation written and designed by Andrew M. Bailey.

Printed in the United Kingdom.

Preface

About this User Guide

This User Guide covers all aspects of the installation, configuration and operation of the ESLINX range of Audio-Visual System Control products.

Key operating principles are explained in general terms and in many cases are demonstrated with practical examples. These ‘building blocks’ are intended to act as an introduction to the system capabilities, from which a systems designer can develop more specialised or complex configurations.

- **Section 1** gives an overview of the system modules and functionality.
- **Section 2** describes the installation of modules into enclosures and gives details on basic installation requirements for all applications.
- **Sections 3** to **11** cover the various functional options, configuration and setting-up of the four ESLINX modules.
- **Section 12** gives basic guidance on multi-module systems.
- **Appendices A** to **D** provide detailed technical information on each module.
- **Appendix E** onwards provide information on products and topics related to the ESLINX range.

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Section 1:
Introduction to ESLINX

The ESLINX System Control Range comprises a series of versatile and compact modules that are designed to handle the diverse requirements of both simple and complex Audio-Visual control systems.

The ESLINX range allows serial control of many types of video disk / tape players together with analogue or digital control of dimmers, electric motors and many other types of equipment. ESLINX uses the Electrosonic ES4000 communications protocol making it fully compatible with other Electrosonic product ranges such as the ESTA II Tapeless Audio system and the PICBLOC Videowall Control system.

The heart of the ESLINX range is the ES1561 Show Control Module which features its own on-board show computer. This is capable of running ‘shows’ created in the **Cthrough+*Plus***, **EASY+**, **BSC** or **Ancor** software applications. The completed shows are held on a removable Flash Memory Card, which allows them to be updated or replaced simply and quickly.

The ESLINX Range

Basic Modules

The ESLINX range comprises four basic modules:

- ES1552 Analogue Output Module
- ES1553 Serial Control Module
- ES1554 Digital Input Output Module
- ES1561 Show Control Module

All of these can be used either as ‘stand-alone’ units or as part of a system with other ESLINX modules or any ES4000-compatible products.

Each module is supplied complete with a fixed front and rear panel on which are mounted the various controls and connections. The rest of the module is of an open construction and is designed to be mounted in a suitable enclosure with a separate power supply.

Module Enclosures

Two types of metal case are available which can accommodate either one or two modules respectively:

- ES1550 Single Module Case
- ES1560 Twin Module Case

In the ES1560, the two modules are mounted side-by-side and can comprise any combination of modules from the ESLINX or certain modules from the ESTA II Tapeless Audio range.

Both types of case can be used in free-standing applications. In addition, by using suitable brackets, the ES1560 can be mounted in a standard 19 inch rack, where it will occupy 1U of vertical rack space.

For details of installing ESLINX Modules into the above enclosures, please refer to Section 2.

Blanking Panels

In applications where only one module is installed in the ES1560 enclosure, a set of front and rear blanking panels is available, which will cover the vacant position.

These panels can also be used in conjunction with either size of case to create an ESLINX-style housing for special user-defined devices, such as a set of scene-recall or show-start buttons.

ES1552 Analogue Output Module

The ES1552 Analogue Output Module has sixteen individually controllable analogue outputs.

Each output provides a voltage that is variable between 0V and 10Vd.c. (nominal), which can be used to directly control a wide variety of devices (*e.g.* electronic lighting ballasts or dimmers), or via a suitable interface to control devices such as electric motors.

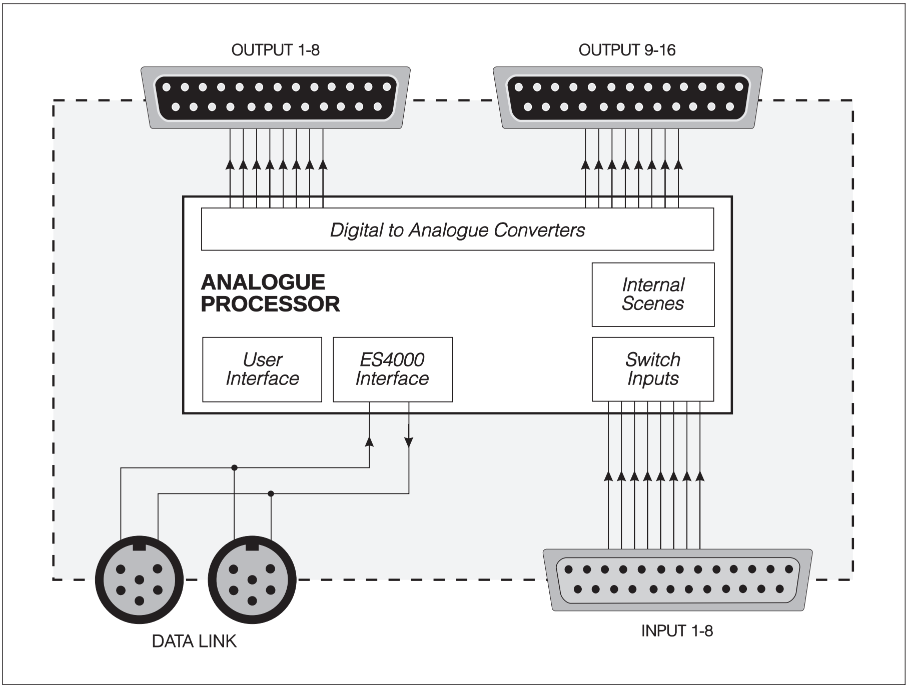


Fig.1-1: Block diagram of the ES1552 Module.

User Set-up

The setting-up of internal parameters is achieved via the various push-button controls and the digital display screen on the front panel. Changes to the default settings are saved in the module’s internal memory and are retained even when the module is turned-off.

The push-button controls also allow basic override control of all analogue output levels. This facility is useful for initial setting-up and testing.

In addition, 16 LED indicators are provided which vary their light levels relative to the voltage levels of the outputs.

Summary of ES1552 Functions

The ES1552 can be operated in one of, or a combination of, the following configurations:

- **Direct Level Control**

  The level of one or more of the sixteen outputs can be set to a new level with immediate effect or within a specified fade time. This is achieved by using ES4000 protocol from an external control device (*e.g.* an ES1561 Show Control Module).

  Levels can also be set manually using the module’s user interface.

- **Scene Selection**

  Pre-programmed levels for each of the sixteen outputs can be stored as a ‘scene’. The ES1552 has the capacity to store up to 8 scenes in its internal memory.

  Each scene also has a definable ‘fade time’ thus allowing the new levels to be set immediately or progressively over a period of time.

  Scenes can be recalled by using the eight switch inputs.

ES1553 Serial Control Module

The ES1553 Serial Control Module provides four serial outputs for the remote control of external equipment such as laser disk or video tape players. In addition, it offers eight internal relays which can be employed for any user-defined low-voltage application.

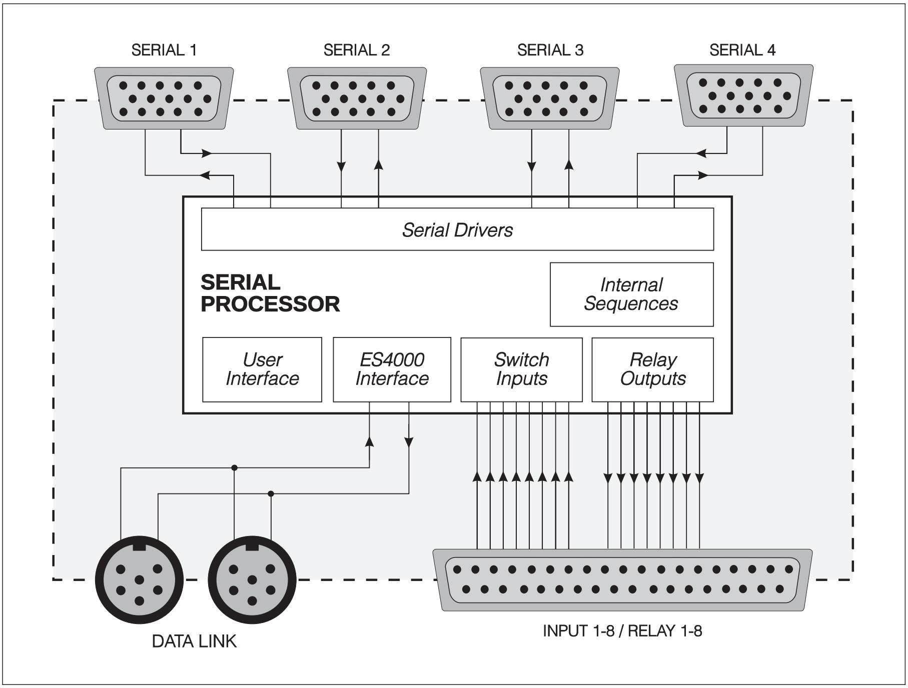


Fig.1-2: Block diagram of the ES1553 Module.

Serial Control

The module incorporates a number of serial drivers suitable for controlling a wide variety of equipment, such as Video Disc Players, Video / Audio Tape Players and CD Players. The module also has the capability to upload new or specialised serial drivers via the **DATA LINK** connector (ES4000 Ring).

Each of the four serial outputs (**SERIAL 1** to **4**) can be configured to one for the following communication standards:

- RS-232 *(default)*
- RS-422
- RS-485
- Infra-Red

The Infra-Red option allows control of devices which only have an infra-red control capability. Special IR Learn software is available which enables serial drivers to be created for devices not covered by the standard IR driver.

In addition, certain serial drivers allow diagnostic feedback from a player to be displayed on the ES1553's LCD display.

User Set-up

The internal parameters of the serial processor are accessed via the six push-button controls and displayed on the LCD display screen on the front panel. Changes to the default settings are saved in the module's internal memory and are retained even when the module is turned-off.

The push-button controls also allow basic override control of all serial outputs, relay outputs and switch inputs. This facility is useful for initial setting-up and testing.

In addition, the LCD display can be used to show special user-defined messages or information (*e.g.* the name of the show currently running).

Summary of ES1553 Functions

The ES1553 can be operated in one of, or a combination of, the following configurations:

- **Player Control**

  Up to four video disc/tape players can be controlled either by using ES4000 protocol from an external control device (*e.g.* an ES1561 Show Control Module) or by using an internal sequence.

- **Relay Control**

  Eight internal relays are provided for any user-defined low-voltage application, *e.g.* controlling automatic dimmers. These can be controlled either by using ES4000 protocol from an external control device or by using an internal sequence.

- **Internal Cue Sequences**

  Up to 17 Internal Cue Sequences can be programmed to provide control of the four players or the eight internal relays. They can also be used for a variety of other functions including customised remote show control.

  These sequences can be started either with ES4000 protocol from an external control device or with the eight switch inputs.

- **Remote Show Control**

  The eight switch inputs can be used to select and run one of eight shows on the system's 'bus master' (*e.g.* an ES1561 Show Control Module or desktop computer running an application program).

  By using additional ES1553 Modules, further blocks of eight shows may be selected up to a maximum of 64 shows (using 8 modules).

ES1554 Digital Input/Output Module

The ES1554 Digital Input / Output Module has sixteen individually controllable relays, each with single-pole change-over 'dry' contacts.

Each relay is suitable for switching loads of up to 50V d.c. or 24V a.c. @ 200mA.

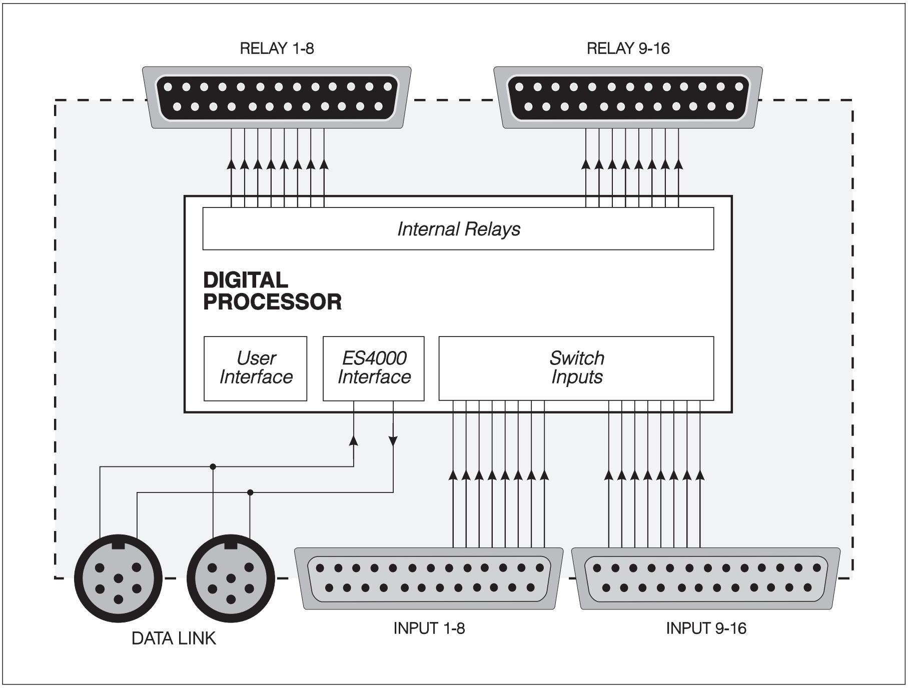


Fig.1-3: Block diagram of the ES1554 Module.

User Set-up

The setting-up of internal parameters is achieved via the various push-button controls and the digital display screen on the front panel. Changes to the default settings are saved in the module's internal memory and are retained even when the module is turned-off.

The push-button controls also allow basic override control of all relay outputs. This facility is useful for initial setting-up and testing. In addition, 16 LED indicators are provided which show the on / off state of each relay.

Summary of ES1554 Functions

The ES1554 can be operated in one of, or a combination of, the following configurations:

- **Relay Control**

  The state of one or more of the sixteen relays can be set by using ES4000 protocol from an external control device (*e.g.* an ES1561 Show Control Module).

  In addition, each relay can be manually operated (or set to ignore ES4000 control) by using the front panel buttons.

- **Remote Show Control**

  The sixteen switch inputs can be used to trigger the transmission of various formats of ES4000 Remote Control (R-type) commands. These can be used to start a show running on an external ES1561 Show Control Module or show computer.

  The front panel buttons can be used for the same purpose.

- **Special Control Options**

  The state of all switch inputs can be automatically transmitted (or transmitted on request) using ES4000 protocol.

  The sixteen switch inputs can also be used to directly operate the relays.

ES1561 Show Control Module

The ES1561 Show Control Module features two distinct functional ‘units’:

- a dedicated **show computer** which is capable of running shows produced by any of Electrosonic’s ES4000-compatible application programs (*e.g.* **Cthrough+*Plus***, **EASY+**, **BSC** and **Ancor**).
- a **serial processor** (similar to the ES1553) which provides two serial outputs for the remote control of external equipment such as laser disc or video tape players. In addition, it offers eight internal relays which can be employed for any user-defined low-voltage application.

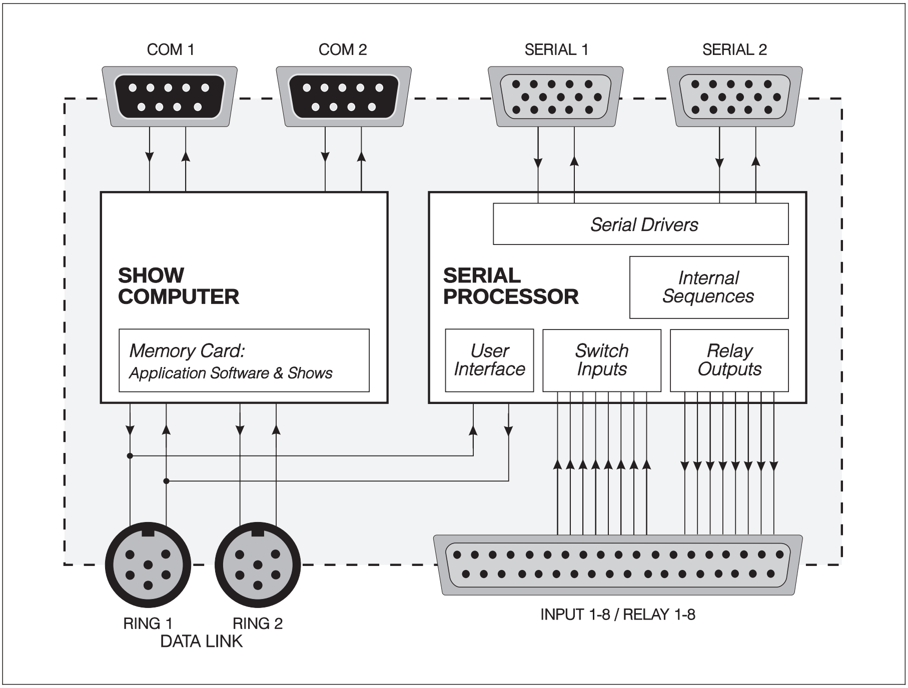


Fig.1-4: Block diagram of the ES1561 Module.

Show Computer

The application software and show(s) are stored on a removable Flash Memory Card. This allows updated shows or different programmes of shows to be implemented very quickly – simply by inserting a new card.

Shows can either be started automatically (on power-up), or in response to switch input events (*e.g.* the operation of a push-button). Show cues are transmitted to external devices (using the ES4000 protocol) via the two **DATA LINK** highways – **RING 1** and **RING 2**.

The show computer has two serial control ports – **COM 1** and **COM 2** – which are used to connect an external PC for programming or interrogation.

Serial Processor

The serial processor unit of the ES1561 module incorporates a number of drivers suitable for controlling a wide variety of equipment, such as Video Disc Players, Video / Audio Tape Players and CD Players. The module also has the capability to upload new or specialised serial drivers.

Each of the two serial outputs (**SERIAL 1 & 2**) can be configured to one of the following communication standards:

- RS-232 *(default)*
- RS-422
- RS-485
- Infra-Red

The Infra-Red option allows control of devices which only have an infra-red control capability. Special IR Learn software is available which enables serial drivers to be created for devices not covered by the standard IR driver.

In addition, certain serial drivers allow diagnostic feedback from a player to be displayed on the module’s LCD display.

NOTE *The serial processor is internally connected to* **DATA LINK RING 1** *(see diagram on page 1-12).*

User Set-up

The operation of the show computer is controlled by the application software and special user-defined files held on the Memory Card.

The internal parameters of the serial processor are accessed via the six push-button controls and displayed on the LCD display screen on the front panel. Changes to the default settings are saved in the module's internal memory and are retained even when the module is turned-off.

The push-button controls also allow basic override control of all serial outputs, relay outputs and switch inputs. This facility is useful for initial setting-up and testing.

In addition, the LCD display can be used to show special user-defined messages or information (*e.g.* the name of the show currently running).

Summary of ES1561 Functions

The ES1561 can be operated in one of, or a combination of, the following ‘standalone’ configurations:

- **Player Control**

  One or two video disc/tape players can be controlled either by a show program on the Memory Card or an internal sequence.

- **Relay Control**

  Eight internal relays are provided for any user-defined low-voltage application, *e.g.* controlling automatic dimmers. These can be controlled either by a show program on the Memory Card or an internal sequence.

- **Internal Cue Sequences**

  Up to 17 Internal Sequences can be programmed to provide control of the two players or the eight internal relays. They can also be used for a variety of other functions including customised show control.

  These sequences can be started either by a show program or by one of the eight switch inputs.

- **Manual Show Control**

  The eight switch inputs can be used to select and run one of eight shows on the Memory Card.

  By using additional ES1553 or ES1554 Modules, further blocks of eight shows may be selected up to a maximum of 64 shows (with 7 *x* ES1553 or ES1554 and 1 *x* ES1561 modules).

- **Automatic Show Control**

  The application program on the Memory Card can be configured to automatically load and run a particular show at power-up. This show can be programmed to repeat continuously or a specific number of times, or to automatically run other shows.

System Applications

As well as being capable of use as free-standing units, all of the modules in the ESLINX range can be linked together using an RS-232 data highway or ‘ring’ to form larger systems.

The ESLINX range uses the Electrosonic ES4000 communication protocol making it fully compatible with many other Electrosonic products such as the ESTA II Tapeless Audio System and PICBLOC Videowall Control System.

For general information on systems usage, refer to Section 12.

Section 2: Installation

The ESLINX range of Modules are designed to be installed in either an ES1550 or ES1560 Enclosure, which accommodate one or two modules respectively.

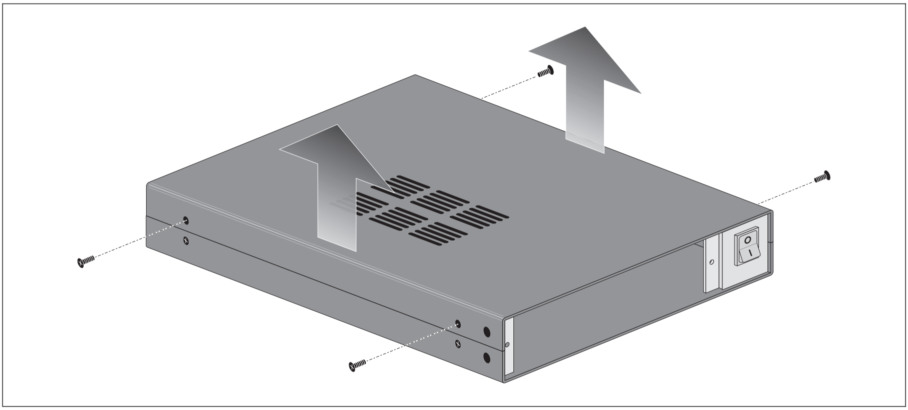
This section describes the procedure for installing a module in both types of enclosure.

The usage of the various external control connections is described in the subsequent sections of this User Guide.

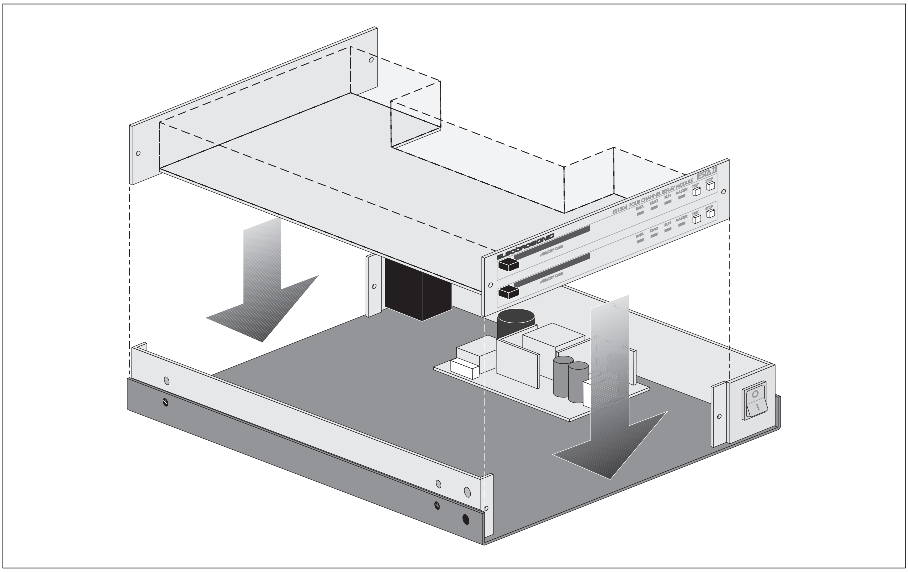
IMPORTANT NOTE
When installing and connecting ESLINX Modules, please pay particular attention to the Earth & Ground Connection details on page 2-7.

Installing a Module into the ES1550

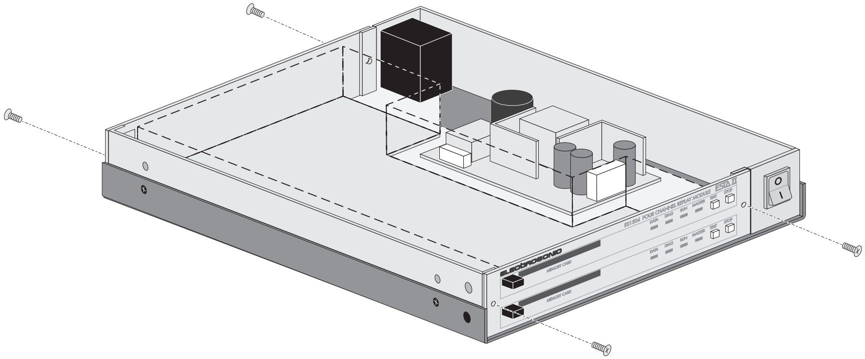
1. Remove the four screws securing the top cover panel and carefully lift the panel upwards until clear of the base assembly.



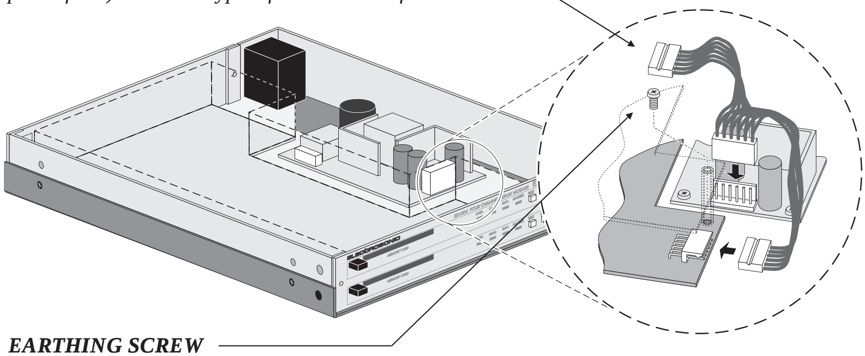
2. Lower the ESLINX Module into position on the base assembly. Ensure that the front and rear panels of the Module are located on the outside of the fixing brackets.



3. Secure the module to the base with the screws provided; two screws through front panel and two screws through rear panel.



4. Fit the Module earthing screw as shown below, then connect the Module to the adjacent Power Supply Unit, using the 6-way connector lead assembly supplied. Ensure correct polarity of both connectors.



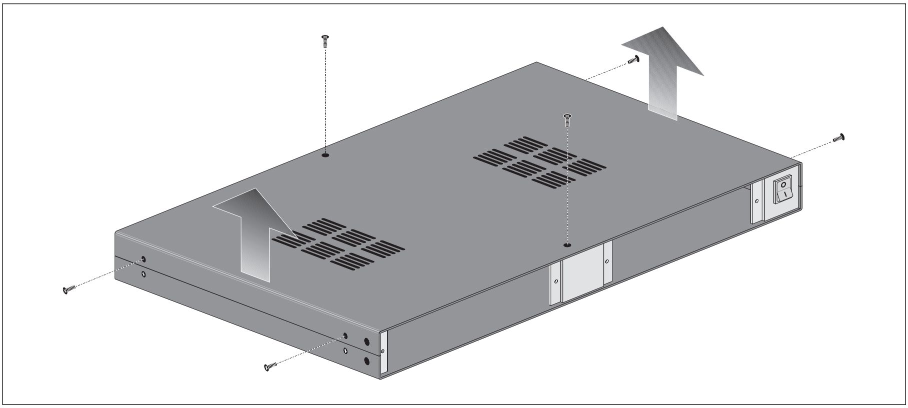
This second lead is used for ESTA II ES1504 modules (which require two power feeds). For other types of module it is left unconnected.

EARTHING SCREW
Short version for single-board modules; Long version ***with spacer*** *between boards for double-board modules (e.g. ESTA II ES1504).*

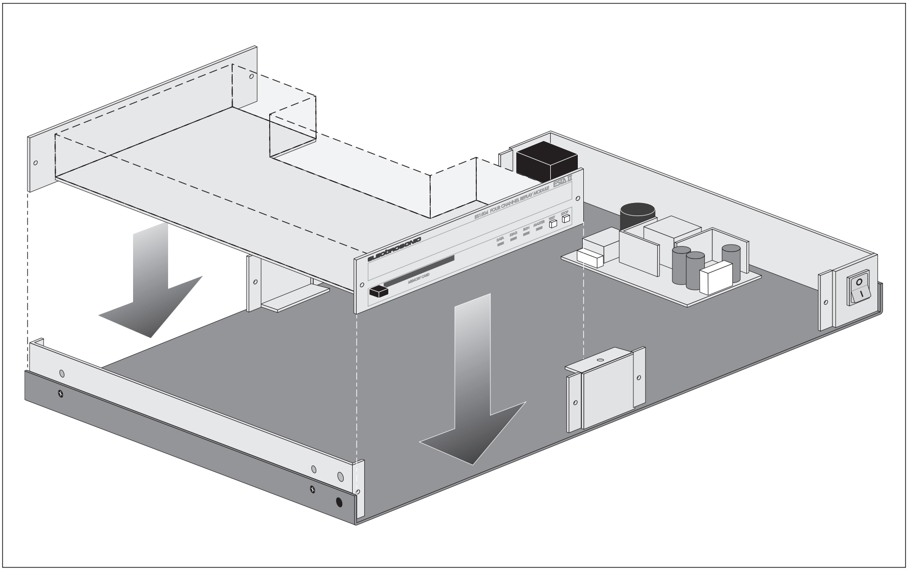
6. Finally, lower the top cover panel into position on the base assembly and resecure with the four fixing screws.

Installing a Module into the ES1560

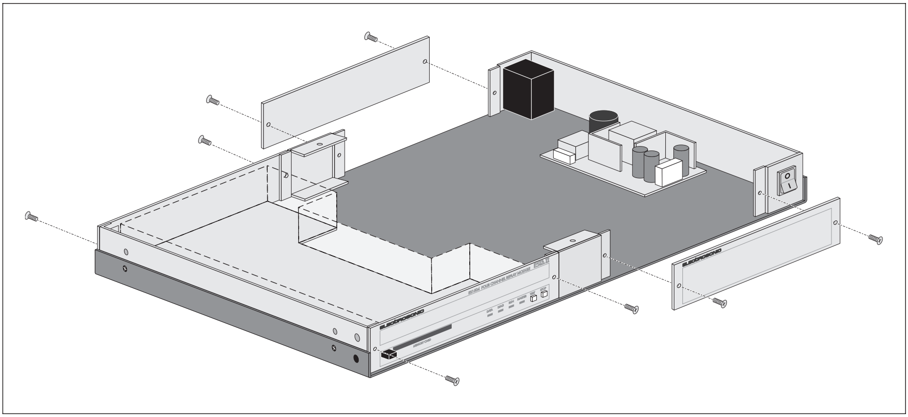
1. Remove the six screws securing the top cover panel and carefully lift the panel upwards until clear of the base assembly.



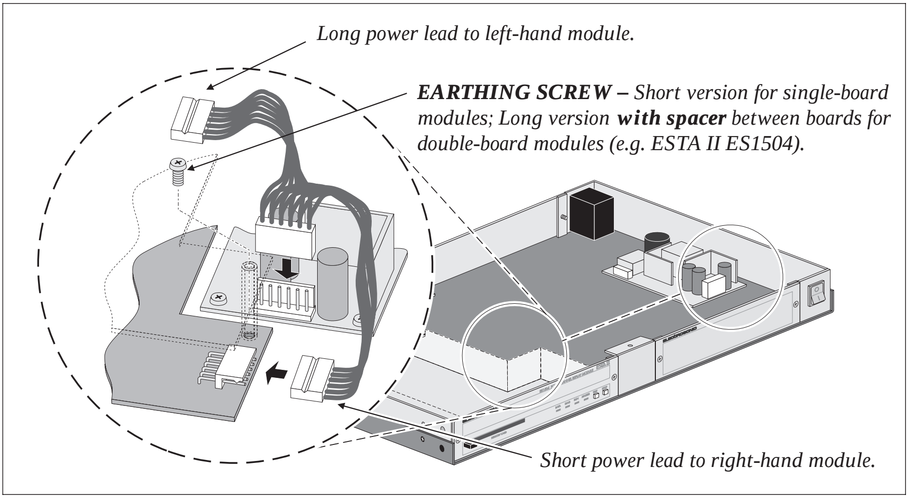
2. Lower the ESLINX Module into the required position on the base assembly. Ensure that the front and rear panels of the Module are located on the outside of the fixing brackets.



3. Secure the module to the base with the screws provided; two screws through front panel and two screws through rear panel.
4. If required, fit a second module to the other position in the base assembly, or attach a front and rear blanking panel.



5. Fit the Module earthing screw as shown below, then connect the Module to the adjacent Power Supply Unit, using the 6-way connector lead assembly supplied. Ensure correct polarity of both connectors.



Long power lead to left-hand module.

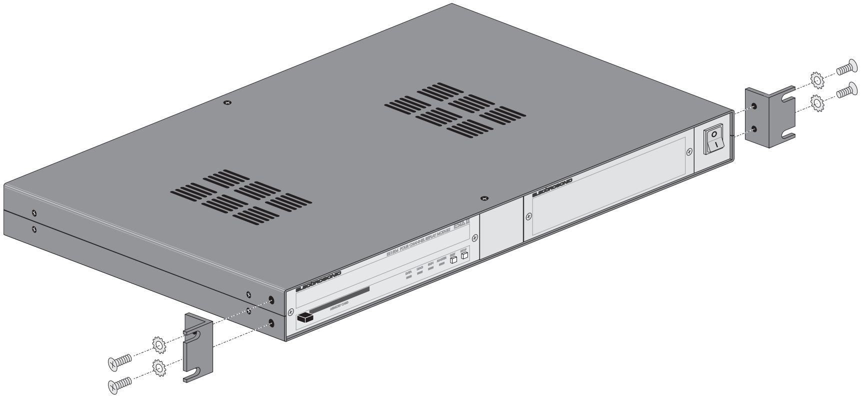
EARTHING SCREW – *Short version for single-board modules; Long version* ***with spacer*** *between boards for double-board modules (e.g. ESTA II ES1504).*

Short power lead to right-hand module.

6. Finally, lower the top cover panel into position on the base assembly and resecure with the six fixing screws.

Rack Mounting the ES1560

The ES1560 enclosure is supplied with two brackets to enable installation into a standard 19 inch rack frame. These must be fitted as shown in the illustration below with grip washers under the screw heads. **Use only the screws supplied** – longer screws may foul internal components!



CAUTION
When the enclosure is rack-mounted, a ventilation space equivalent to 1U (44mm) must be left between the top and bottom of the enclosure and any adjacent units.

Earth & Ground Connection

WARNING All ESLINX products must be correctly earthed.

The metal casing of the ESLINX enclosures (ES1560 and ES1550) is connected to earth via the mains lead.

When installed in the enclosure, each module has a direct connection to the casing (and thus to earth) via the module's earthing screw.

The 0V ground/common rail of the ES1552, ES1553, ES1554 and ES1561 modules is referenced to earth via a 10kΩ (nominal) resistive coupling to provide EMC screening.

All connector shells, when mated with the module are directly connected to earth to provide EMC screening.

Data Cable Screening

All interconnecting cables used for Serial RS-232, RS-422 or RS-485 data communications **must** be screened to conform with the EMC standard.

In addition the following criteria must observed:

- All 'D'-type connector covers must be of a metal or screened type.
- When making a connection between the RS-232 (**DATA LINK**) connectors of two modules installed in an ES1560 Twin Module Case, the connecting lead must have a ferrite bead fitted at both ends.

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Section 3:
ES1552 Configurations

The diagram below illustrates the main functional blocks within the ES1552 Analogue Output Module plus their related control inputs and outputs:

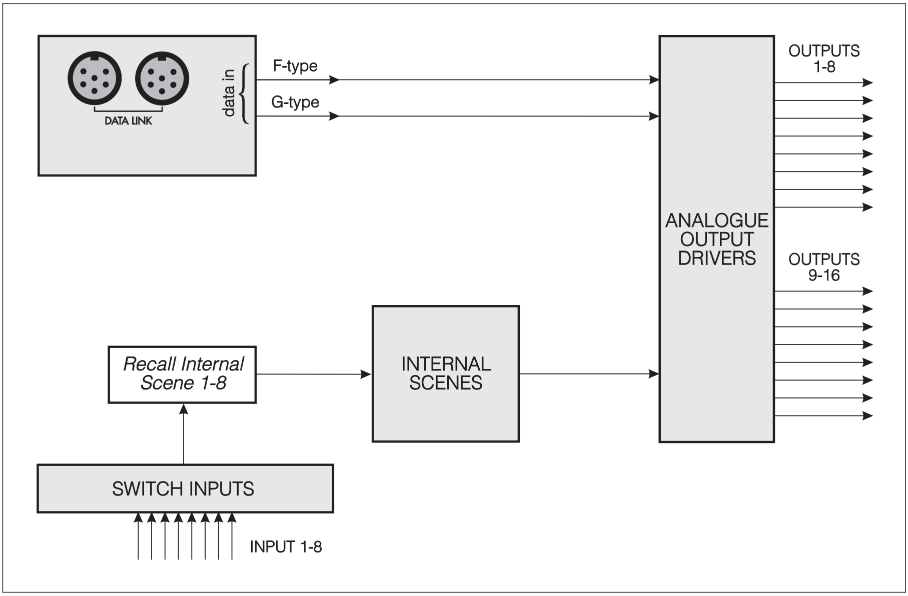


Fig.3-1: Block diagram of ES1552 functions & control.

This section provides details on the basic operating configurations which can be used to control the analogue outputs of a single module.

In practice, a combination of two or more of these configurations may be used at the same time.

Direct Level Control (via ES4000 protocol)

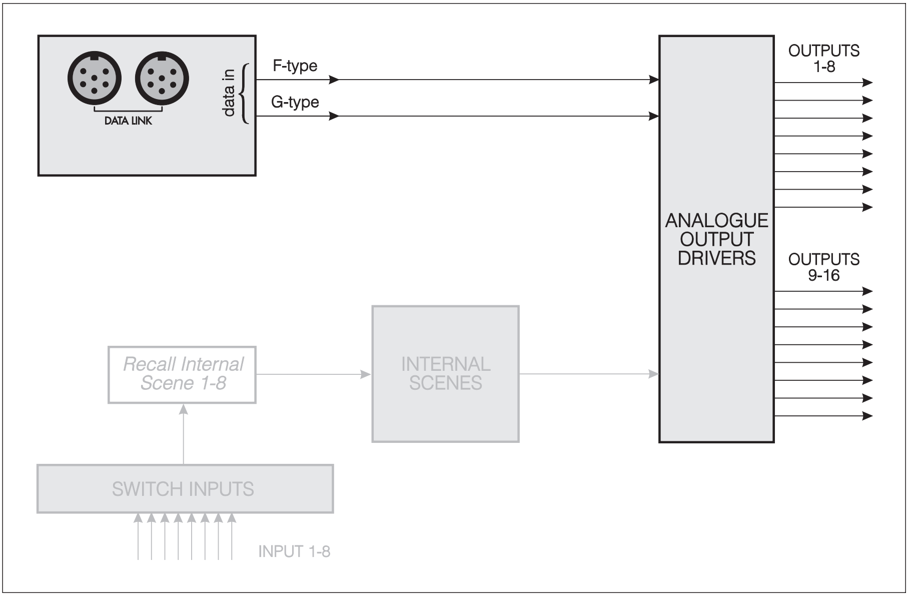


Fig.3-2: Direct level control using ES4000 protocol.

In this configuration, F-type or G-type commands are received via the 'data in' terminal of the **DATA LINK** connector. These are decoded internally and used to set a new level for one or more analogue outputs. Both types of command also include a 'fade time' value; this defines how long the output will take to reach the newly specified level.

The Output Response setting of the module also affects how the outputs are updated following a request for a new level (see page 4-8 for details).

Source of F-type & G-type Commands

F-type commands are generated automatically by the Analogue control function within Electrosonic's **EASY+** and **BSC** software packages, whilst G-type commands are provided by **Ancor**.

Alternatively, customised F-type or G-type commands may be created in the above packages (and also **Cthrough+*Plus***) by utilising transmittable comment or remark cues. Further details on F-type and G-type command formats are given on page I-10 and I-12 respectively.

Address & Baud Rate Setting

The Address setting of the module defines which block of 16 channels (out of the possible 320 controllable by the ES4000 protocol) that are to be used to control the analogue outputs. For further details, refer to page 4-4

The module's Baud Rate must be set-up to match that of the controlling device. In most instances, the default of 19200 will be used; to check or change this setting, refer to page 4-13.

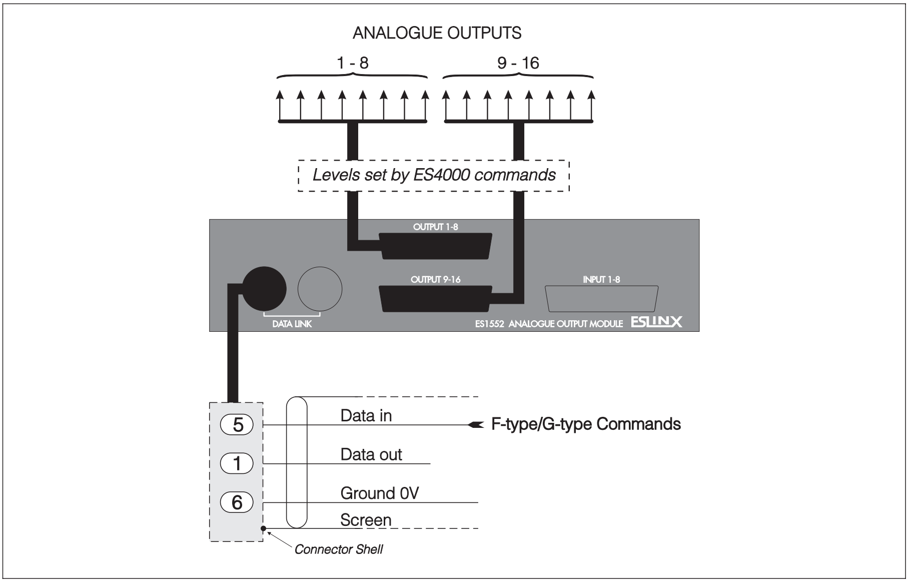


Fig.3-3: Direct level control with F-types or G-types.

Scene Selection (via switch inputs)

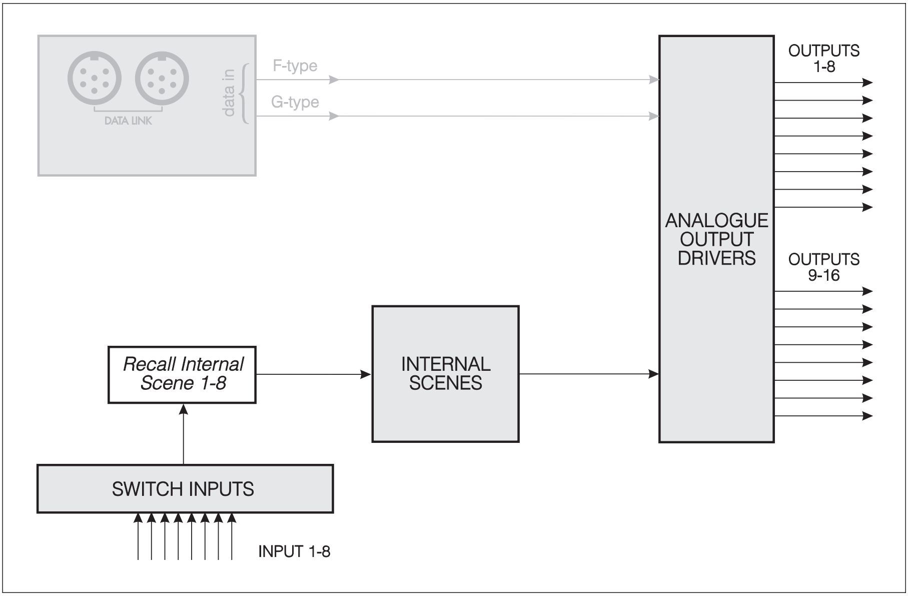


Fig.3-4: Scene selection using switch inputs.

In this configuration, the eight digital / switch inputs are used to select one of the 8 internal 'scenes' which, in turn, sets the levels for one or more analogue outputs. Each scene includes a 'fade time' value; this defines how long the outputs will take to reach the newly specified levels.

The Output Response setting of the module also affects how the outputs are updated following a request for a new level (see page 4-8 for details).

Scenes are pre-programmed by using the ESLINX scene programming facility in **EASY+**. Alternatively, programming can be achieved with transmittable comment cues using the new ES4000 'lower' g-type command (see page I-12 for details of the g-type command format)

Switch Inputs

The switch inputs SW1 to SW8 of the **INPUT 1-8** connector correspond directly to scenes 1 to 8.

Each input is opto-isolated and has two terminals; to activate a particular input, connect its ‘input’ terminal to 12V (pin 24 or 25) and its ‘com’ terminal to 0V (pin 17 or 18). Each input is protected against reverse polarity.

Fig.3-5 (on the next page) shows a typical method of connecting the inputs using the internal 12 Volt supply via mechanical switches. Note that the ‘input’ or ‘com’ side of several inputs may be ‘commoned’. Alternatively, the inputs can be directly driven from a digital output device.

If more than one input is active at one time, the module can handle the conflict in one of two ways:

- Last input event takes precedence *(default setting)*.
- Highest input event takes precedence (SW8 has highest priority).

For further details, refer to Input Response Mode on page 4-9.

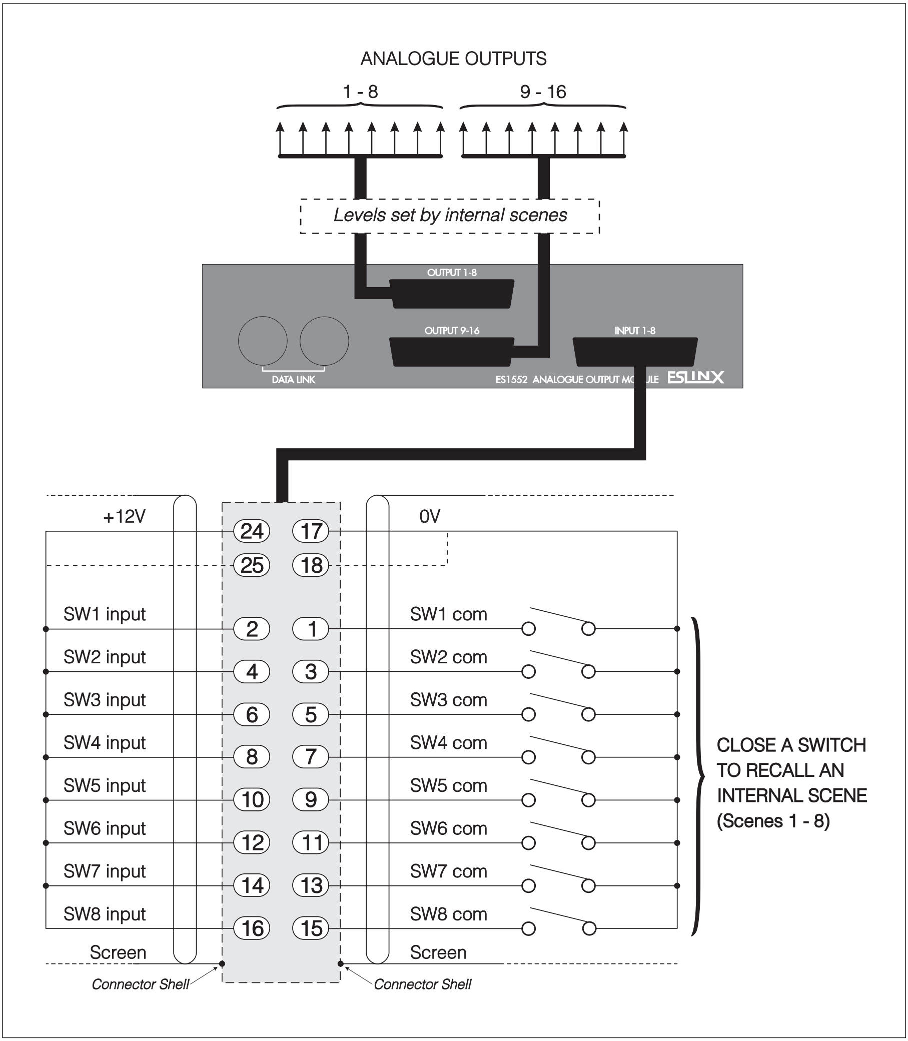
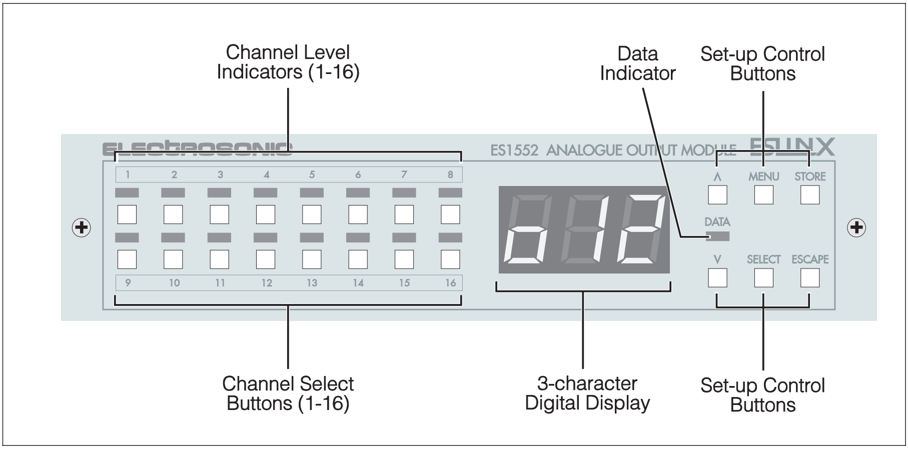


Fig.3-5: Scene selection using switch inputs.

Section 4:
ES1552 Set-up Procedures

Control Panel Overview



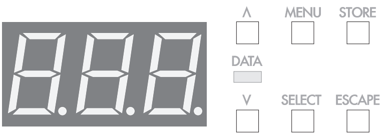
The front control panel comprises the following buttons and indicators which are used for viewing and changing the ES1552 module's internal set-up parameters:

• **3-character Digital Display**	for displaying the various set-up menus and parameters.
• **6 Set-up Control Buttons**	for viewing and changing the various parameters.
• **16 Channel Select Buttons**	for choosing particular channels for certain set-up options.
• **16 Channel Level Indicators**	which give a representation of the current channel levels by varying brightness.

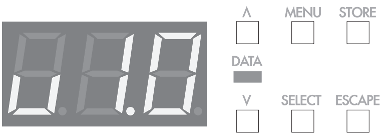
Power-up Self Test

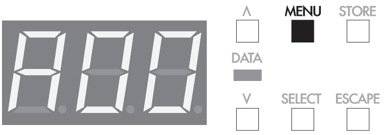
When the power to the ES1552 module is turned-on, an automatic self-test operation is performed. This will take approximately five seconds to complete, during which time all segments of the digital display will be lit.

When the self-test operation has completed, the digital display will show the version number of the currently installed firmware. It is important to quote this number if you have any queries regarding operation of the module.

<table>
<tr><td>1. At power-up, the module will perform a self-test operation, during which time (approx. 5 seconds) all segments of the digital display will be lit.</td><td>
</td></tr>
<tr><td>2. The display will then clear to show the Firmware Version (*e.g.* v1.0).

This will remain for approx. 30 seconds and then change to the default Address Mode.

Alternatively, to bypass this delay and go directly to Address Mode, press the **MENU** *button.*</td><td>


</td></tr>
</table>

Set-up/Display Modes

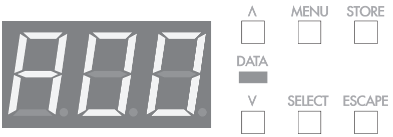
There are eight set-up / display modes:

• Address *(default)*	*(see page 4-4 onwards)*
• Output Channel / Level	*(see page 4-6 onwards)*
• Output Response	*(see page 4-8 onwards)*
• Input Response	*(see page 4-9 onwards)*
• Button Lock	*(see page 4-10 onwards)*
• Scene Number / Levels	*(see page 4-11 onwards)*
• Baud Rate	*(see page 4-13 onwards)*
• Diagnostic	*(see page 4-14 onwards)*

Refer to the pages indicated for full details on each mode.

Selecting the Menu/Set-up Mode

With the default Address Mode displayed, press the **MENU** button to step forward to the next mode.



Pressing and holding the **MENU** button will cause the display to cycle through the available modes until the button is released.

Output Channel/Level...

Output Response..

Input Response

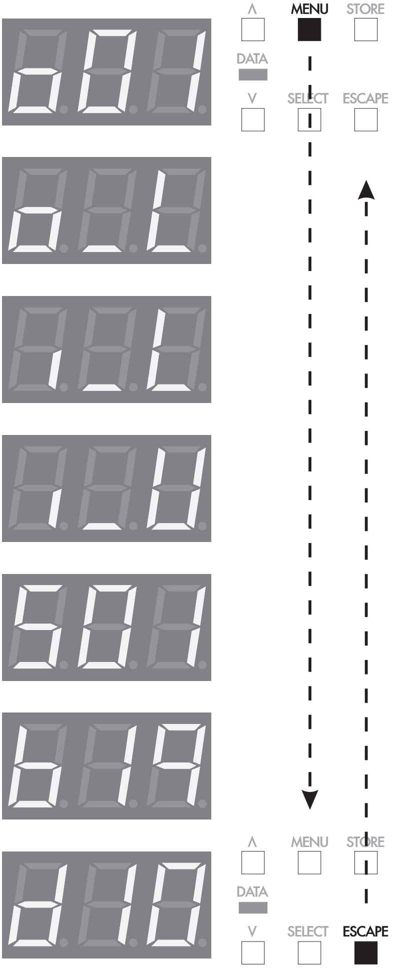
Button Lock...

Scene Number/Levels...

Baud Rate...

Diagnostic...

...then back to Address Mode, etc.



Similarly, to step backward, press the **ESCAPE** button; press and hold the **ESCAPE** button to return to the default Address Mode from any other mode.
With the exception of Output Channel/Level Mode, the display will automatically revert to Address Mode if no buttons have been pressed within 15 seconds.

Address Mode

The ES4000 protocol has the capability to control the level of up to 320 separate analogue channels (using F-type or G-type commands); these are arranged in 10 ‘banks’ of 32 channels.

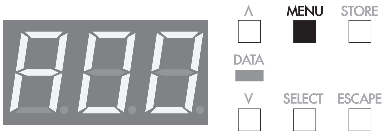
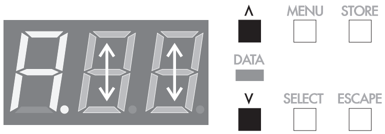
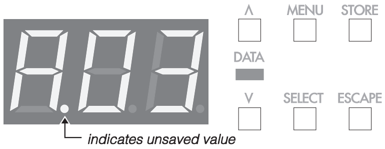
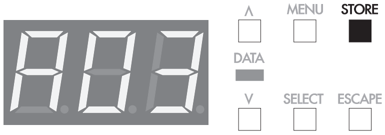
NOTE *In practice, the available range of channels will usually be limited by the software package being used rather than the protocol.*

Since the ES1552 only controls 16 channels, the Address parameter is used to define which block of 16 channels is to be controlled. Note that each ‘bank’ is served by two Address settings:

ES1552 Address	**Bank No.**	**Channel Range**	
		In Bank	**Actual**
A00	0	01 – 16	01 – 16
A01	0	17 – 32	17 – 32
A02	1	01 – 16	33 – 48
A03	1	17 – 32	49 – 64
A04	2	01 – 16	65 – 80
A05	2	17 – 32	81 – 96
...	...	...	...
A18	9	01 – 16	289 – 304
A19	9	17 – 32	305 – 320

The ES1552 has a maximum Address setting of A32 to allow for specialist applications and future expansion.

Changing the Module Address

1. Check that the display is showing Address Mode; if not, press the **MENU** button until it is displayed.	
2. Use the ∧ or ∨ buttons to change the address to the required value.	
3. The dot that appears after the 'A' character shows that the displayed value is not yet saved in the internal memory.	 ∧ MENU STORE DATA ∨ SELECT ESCAPE indicates unsaved value
4. To save the new Address setting, press the **STORE** button. *The dot will disappear, and the* **DATA** *indicator will flash red to show that the new setting is being saved.*	
Press the **MENU** button to go to Output Channel / Level Mode. Press the **ESCAPE** button to go to Baud Rate Mode.	

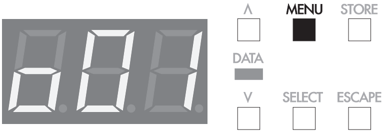
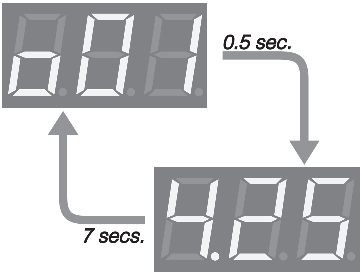
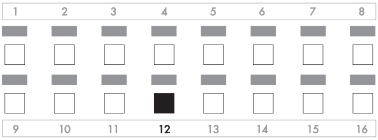
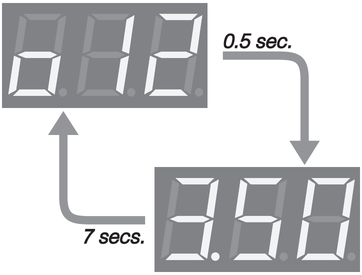
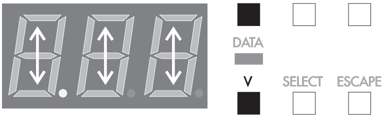
Output Channel/Level Mode

This mode allows the present level of each analogue output to be viewed and, if required, manually changed. Any modified voltage level is not stored in memory, but will be retained until changed by an ES4000 command or scene selection, or until the module is turned-off .

This mode can be left selected (*i.e.* it will not revert to Address Mode).

Whilst in this mode, the display automatically toggles between showing a channel number and the voltage level for that channel. The Channel Select buttons (1 to 16) are used to change the number of the displayed channel.

Viewing or Changing the Output Levels

1. Press the **MENU** button until Output Channel/Level Mode is displayed.	
2. Whilst in this mode, the display will alternate between two values: ...the output **channel number**, (*e.g.* output 1 will appear as o01), and... ...the present **voltage level** of that channel, (*e.g.* 4.25V)...	
3. To display the voltage level for another channel, press the corresponding Channel Select button (*e.g.* channel 12). **Note:** *The* **DATA** *indicator will flash red for a few seconds.*	
4. The newly selected channel number and voltage level will now be displayed.	
5. To raise or lower the voltage level for the presently selected channel, press the ∧ or ∨ buttons respectively. *Each button-press will step the value by 0.01V. Holding a button, will progressively cause the step size to increase, enabling faster changes.*	

Press the **MENU** button to go to Output Response Mode.
Press the **ESCAPE** button to go to Address Mode.

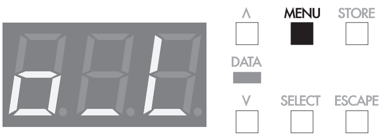
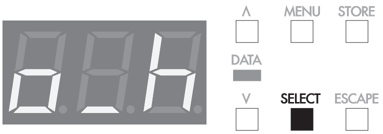
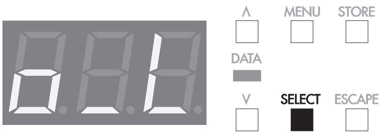
Output Response Mode

This mode is used to determine how all of the analogue outputs are updated in response to new level instructions, whether these are given by an ES4000 command, scene selection, or via the front panel controls.

There are two options available:

- o_L **Last Requested Level** – in which each output will *always* go to a newly requested level (within any fade time specified). This is the default and usual setting.
- o_h **Highest Requested Level –** in which each output will only go to a newly requested level if it is *higher than* the present level, thus creating a 'peak hold' style of operation.

Changing the Output Response

1. Press the **MENU** button until Output Response Mode is displayed. *The default setting is Last Requested Level as indicated by* o_L .	
2. To change the setting, press the **SELECT** button. *The Highest Requested Level option is indicated by* o_h .	
3. Further presses of the **SELECT** button will toggle the setting between the two options	
Press the **MENU** button to go to Input Response Mode. Press the **ESCAPE** button to go to Output Channel/Level Mode.	

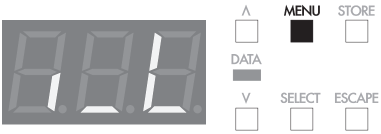
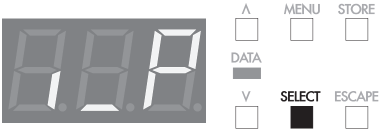
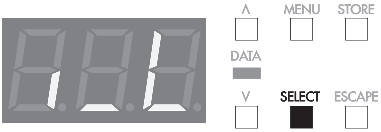
Input Response Mode

This mode is used to determine how multiple events on the eight digital/switch inputs are handled when controlling the recall of scenes.

There are two options available:

- i_L **Last input event** – in which each input event will recall the scene corresponding to that input, until superseded by another input event. This is the default and usual setting.
- i_P **Priority input event** – in which the eight inputs are prioritised with input 8 as the most important. For example, if input 4 is active, its corresponding scene will be recalled; any events on inputs 1 to 3 will be ignored, but an event on input 5 (or above) would be accepted and cause scene recall.

Changing the Input Response

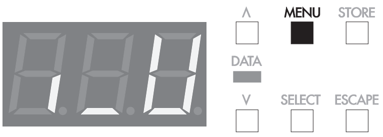
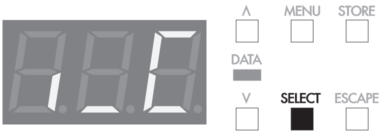
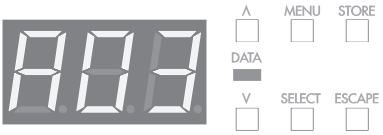
1. Press the **MENU** button until Input Response Mode is displayed. *The default setting is Last Input Event as indicated by* i_L.	
2. To change the setting, press the **SELECT** button. *The Priority Input Event option is indicated by* i_P.	
3. Further presses of the **SELECT** button will toggle the setting between the two options	
Press the **MENU** button to go to Button Lock Mode. Press the **ESCAPE** button to go to Output Response Mode.	

Button Lock Mode

This mode is used to disable the operation of all the front panel buttons. There are two options available:

- ı_U **Unlocked** – in which all buttons operate normally. This is the default option and is always invoked at power-up.
- ı_C **Locked** – in which all buttons are disabled, to prevent accidental or unauthorised changes to the module's set-up.

Disabling the Front Panel Buttons

1. Press the **MENU** button until Button Lock Mode is displayed. *The default setting is Unlocked as indicated by* ı_U.	
2. To lock-out further button operations, press the **SELECT** button. *The Locked option is indicated by* ı_C.	
3. Further button presses will now be ignored and the display will return to Address Mode after 15 seconds.	

> ***IMPORTANT NOTE***
> *As soon as the Locked option is selected, all buttons will be disabled. The only way to return to the Unlocked condition is to reset the module e.g. by turning the mains power off for a couple of seconds and then back on.*

Scene Number/Levels Mode

This mode is used to manually select the internally stored scenes and to examine the pre-programmed levels.

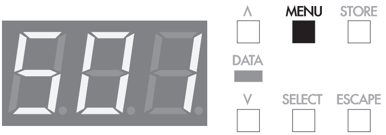
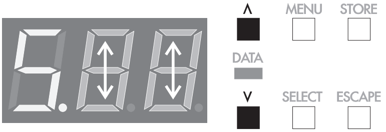
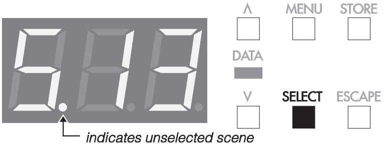
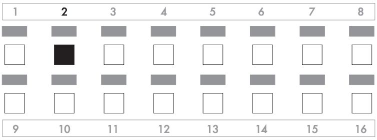
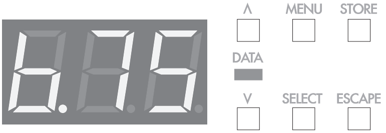
Default Scene Levels

The ES1552 module is supplied with Scenes 1 to 5 programmed with a 5-second fade time and the following channel levels:

• Scene 1	all channels at 0
• Scene 2	all channels at 25%
• Scene 3	all channels at 50%
• Scene 4	all channels at 75%
• Scene 5	all channels at 100%

Scenes can be programmed using the ESLINX scene programming facility in **EASY+** or with transmittable comment cues using the ‘lower’ g-type command format (see page I-I).

Viewing the Scene Levels

1. Press the **MENU** button until Scene Number/Level Mode is displayed.	
2. The number shown by the two right-hand digits indicates the last scene number to be recalled. To change the current scene pointer to a different number, use the ∧ or ∨ buttons.	
3. The dot following the ‘S’ character shows that the scene number displayed has not been selected or recalled. To select the scene and update the current scene pointer, press the **SELECT** button.	 ∧ MENU STORE DATA ∨ SELECT ESCAPE indicates unselected scene
4. To view the voltage level for a channel within the currently selected scene, press the corresponding Channel Select button. *For example, to view channel 2...*	 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
5. The voltage level for that channel will now be displayed (*e.g.* 6.75V)... *To view a different channel, simply press the appropriate Channel Select button.*	

Press the **MENU** button to go to Baud Rate Mode.
Press the **ESCAPE** button to go to Button Lock Mode.

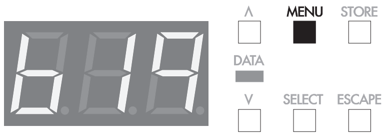
Baud Rate Mode

This mode is used to select the communication baud rate of the module when being operated via the **DATA LINK** (RS-232) highway. There are five options available:

- b 19 = **19200** (*default*)
- b38 = **38400**
- b57 = **57600**
- b76 = **76800**
- b 11 = **115200**

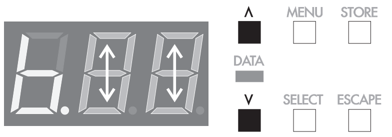
Changing the Baud Rate

1. Press the **MENU** button until the Baud Rate Mode is displayed.

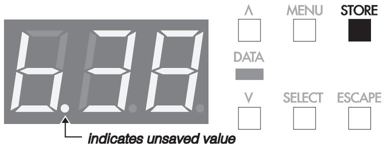


2. Use the ∧ or ∨ buttons to change the Baud Rate to the required value.

(see list above for available settings).

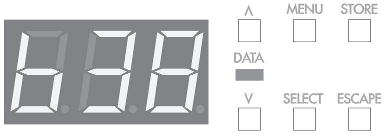


3. The dot that appears after the ‘b’ character shows that the displayed setting is not yet saved in the internal memory.



4. To save the new Baud Rate setting, press the **STORE** button.

The dot will disappear, and the **DATA** *indicator will flash red to show that the new setting is being saved.*

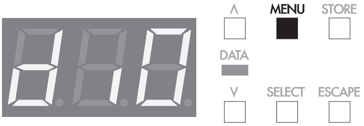


Press the **MENU** button to go to Diagnostic Mode.
Press the **ESCAPE** button to go to Scene Number / Levels Mode.

IMPORTANT: ***THE MODULE MUST BE REBOOTED*** *(by turning power off then on)* ***BEFORE IT WILL USE THE BAUD RATE NEW SETTING***.

Diagnostic Mode (*not implemented*)

PLEASE NOTE:
THIS FEATURE WILL BE PROVIDED IN A FUTURE FIRMWARE RELEASE.
IN THE PRESENT VERSION ONLY THE TOP LEVEL MENU IS DISPLAYED.



Press the **MENU** button to go back to Address Mode.
Press the **ESCAPE** button to go to Baud Rate Mode.

Section 5:
ES1553 Configurations

The diagram below illustrates the main functional blocks within the ES1553 module plus their related control inputs and outputs:

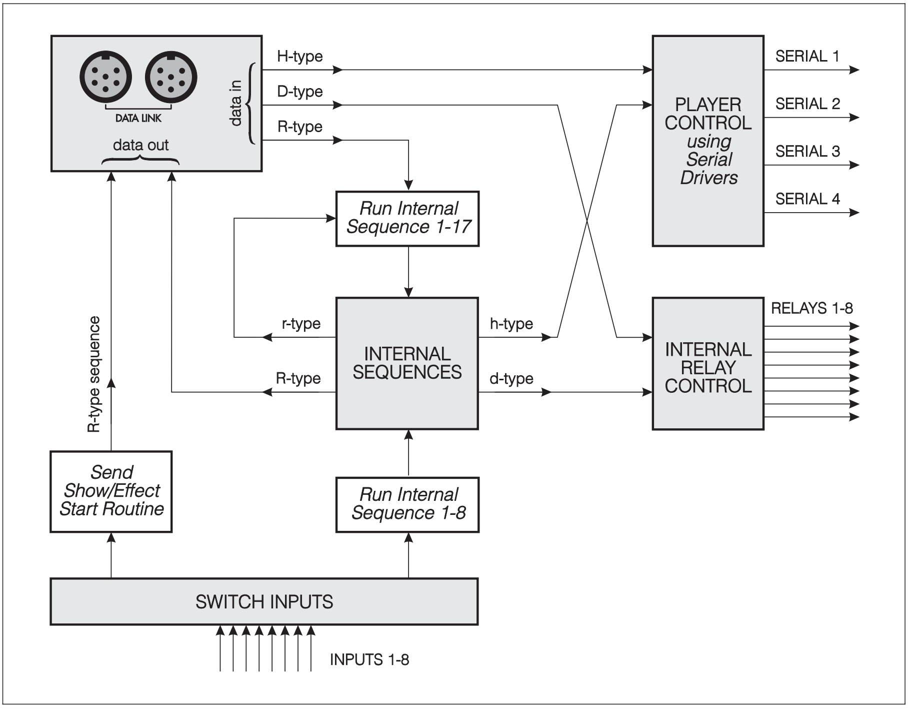


Fig.5-1: Block diagram of ES1553 functions & control.

This section introduces the various configurations that are possible by explaining the operation and available options within each block.
In practice, a combination of two or more of operating configurations may be used at the same time.

Player Control

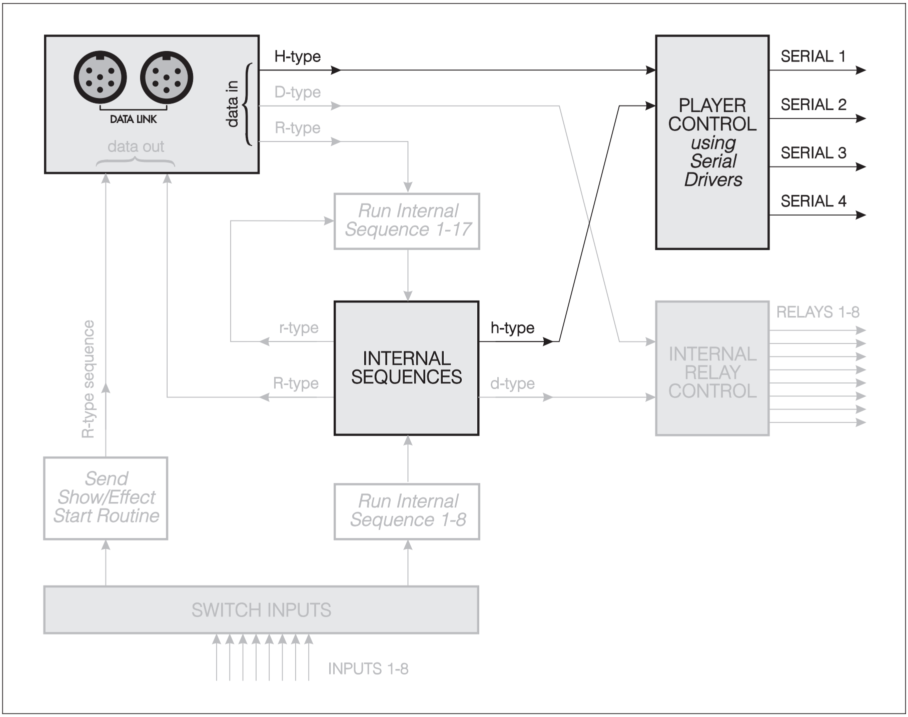


Fig.5-2: Player control options

Up to four external devices (*e.g.* video tape / disc players) can be connected via the **SERIAL 1**, **2**, **3** and **4** connectors.

These devices can be controlled using either or both:

- an **external ES1561 Show Control Module** or show computer (*using the H-type or Z-type command format*), or
- an **internal sequence**, (*using the 'lower' h-type command format*).

The module uses the appropriate internal serial drivers to translate these commands into suitable instruction codes for remote controlling the players.

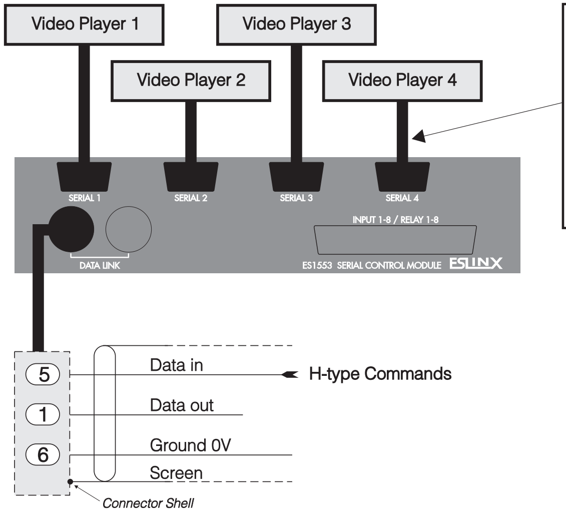
Controlling Players from an External Show

The tape / disc ‘player control’ functions provided by Electrosonic’s **Cthrough+*Plus***, **EASY+** and **BSC** application programs automatically generate the required H-type command format. These programs allow full control of player operation (*e.g.* play, rewind, search, *etc.*) and also the setting of the player type (*i.e.* the serial driver to be used).

Alternatively, customised H-type commands may be created in the above applications by utilising transmittable comment or remark cues. Further details on the H-type command format are given on page I-16.

The application program (and show) is run either on a separate ES1561 module or show computer, and transmits control commands to the ES1553 module via the **DATA LINK** connector (as shown in Fig.5-3).

Since the H-type command format can support up to 24 ‘players’ (depending on the limits of the application program), it is necessary to define which four of these are assigned to the outputs **SERIAL 1, 2, 3** & **4**. This is governed by the ‘Players’ setting in the Parameter Menu (see page 6-16).



IMPORTANT NOTE
Different players require different connections to the **SERIAL 1 – 4** *sockets.*

For pin-out and connection details, refer to pages B-8 and B-9.

Fig.5-3: Connections for Player Control.

Controlling Players from an Internal Sequence

Internal sequences can be made to control the players by using cues in the ‘lower’ h-type command format. These cues are programmed using the 4-DISC software utility – for further details, refer to Appendix H.

For further details on using Internal Sequences, refer to page 5-9.

Serial Drivers

The serial drivers are chosen to match the type of tape / disc players to be controlled – refer to Appendix E for a list of the drivers included with the ES1553 module. The required drivers are either selected manually via the control panel (using the Player Set-up menu – see page 6-5) or via the application program.

Each serial output can be configured to use RS-232, RS-422, RS-485 or Infra-Red communication standards. Selecting a serial driver via the Player Set-up Menu will automatically set the correct default standard and baud rate, *etc.*, for that driver. These parameters may then be altered to suit individual circumstances.

The serial driver and its associated parameters can also be set or changed by using H-type (or h-type) transmittable comments. Further details on the H-type command format are given on page I-16.

> ***IMPORTANT NOTE:*** *Different communication standards require different* **SERIAL** *socket connections; see pages B-8 and B-9 for details.*

Creating New Serial Drivers

New serial drivers will be released periodically by Electrosonic as new players become available or enhancements made to existing products.

You may also wish to generate customised serial drivers for special applications or non-standard devices. New drivers can be created using a conventional text editor (*e.g.* DOS ‘EDIT’) and then down-loaded into the module (via the **DATA LINK** ring) by using the DRVPROG utility. Refer to page E-3 for further details.

Relay Control

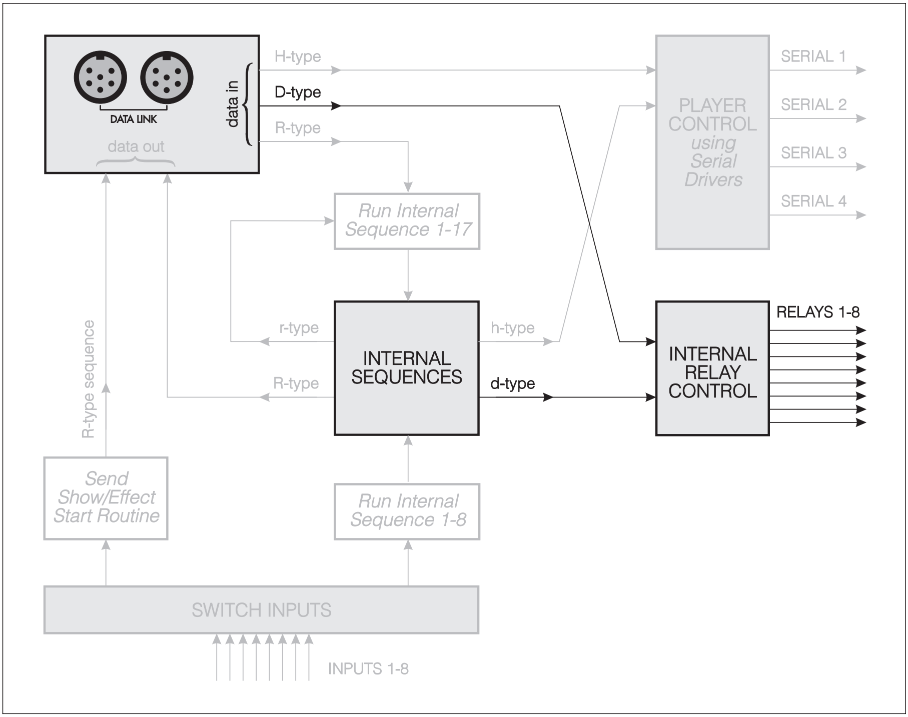


Fig.5-4: Relay control options.

The eight internal relays can be controlled using either or both:

- an **external ES1561 Show Control Module** or show computer (*using the D-type command format*), or
- an **internal sequence**, (*using the 'lower' d-type command format*).

Controlling Relays from an External Show

The ‘relay control’ functions provided by Electrosonic’s **Cthrough+*Plus***, **EASY+** and **BSC** application programs automatically generate the required D-type commands.

Alternatively, customised D-type commands may be created in the above applications by utilising transmittable comment or remark cues. Further details on the D-type command format are given on page I-4.

The application program (and show) is run either on a separate ES1561 module or show computer, and transmits control commands to the ES1553 module via the **DATA LINK** connector (as shown in Fig.5-5 on page 5-8).

Since the D-type command can support up to 96 relays (depending on the limits of the application program), it is necessary to define which ‘block of eight’ are assigned to the outputs **RELAYS 1–8**. This is governed by the ‘Relays’ setting in the Parameter Menu (see page 6-16).

Extended D-type Commands

The standard D-type command controls relays in groups of four and all relays within that group will be forced to an On / Off state. In the various application programs, all relays are forced to an Off condition when a new show is loaded. The application then maintains an on-going status for each relay throughout the show as each (D-type) Relay cue is encountered.

When using transmittable comment cues to control relay operation, the current status of relays may not be known. You may also require the state of one or more relays in a show to be variable according to an unpredictable event (*e.g.* user interaction).

The ES1553 can use an extended form of the D-type command which allows selected relays to be ‘enabled’. This means that a specific relay(s) can be made to operate independently of the others in its group of four. Currently this extended D-type command can only be created using the transmittable comment / remark cue facility in **Cthrough+*Plus***, **EASY** and **BSC**. Further details on the extended D-type command format are given on page I-6.

Controlling Relays from an Internal Sequence

Internal sequences can be made to control the relays by using cues in the ‘lower’ d-type command format (either standard or extended). These cues are programmed using the 4-DISC utility – for further details, refer to Appendix H.

For further details on using Internal Sequences, refer to page 5-9.

Relay Operation & Connections

The state of each relay is defined as follows:

- **Off** contact Com makes with NC,
- **On** contact Com makes with NO.

All relays are set to the Off state at power-up or reset.

Electrical connection to the relay contacts is achieved via the **RELAYS 1-8** connector, as shown in Fig.5-5 on page 5-8.

Each relay is capable of switching up to 50V d.c. or 24V a.c. @ 200mA. For full technical details, refer to page B-6.

WARNING

These relay contacts are ***not*** *safety isolated and are* ***not suitable for mains voltage operation.***

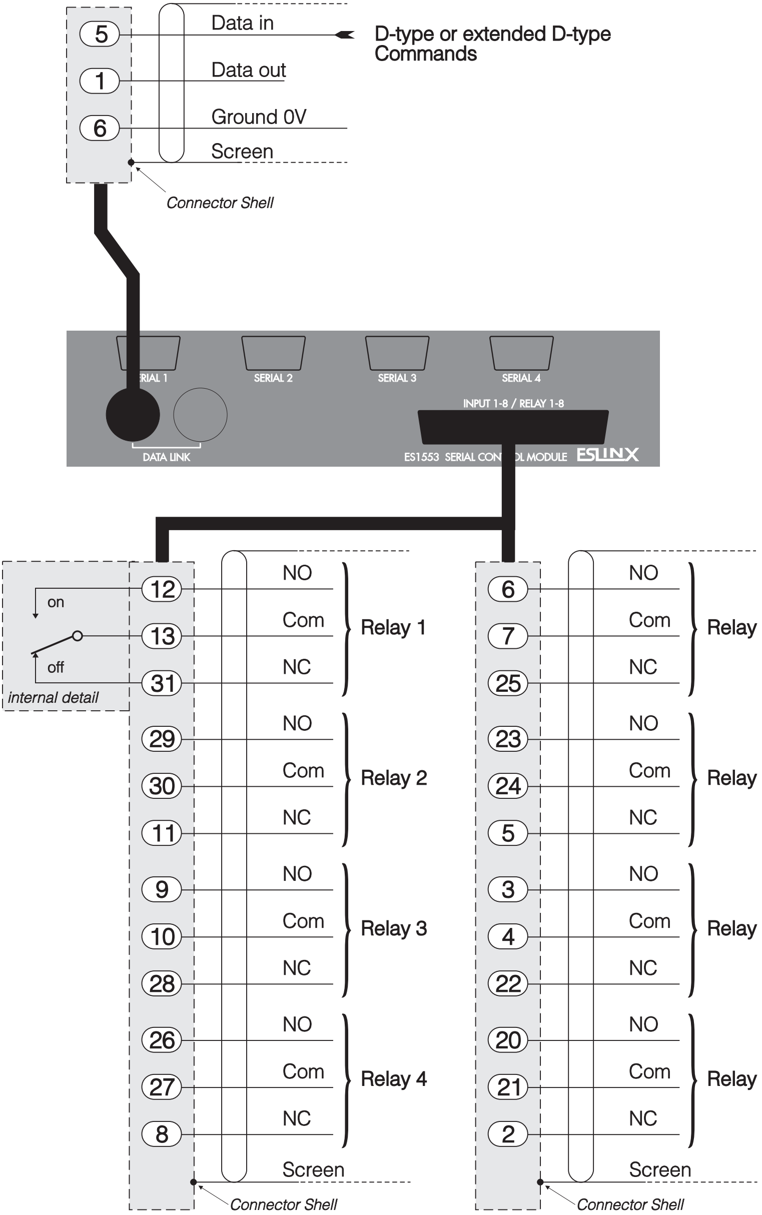


Fig.5-5: Connections for the internal relays.

Internal Sequences

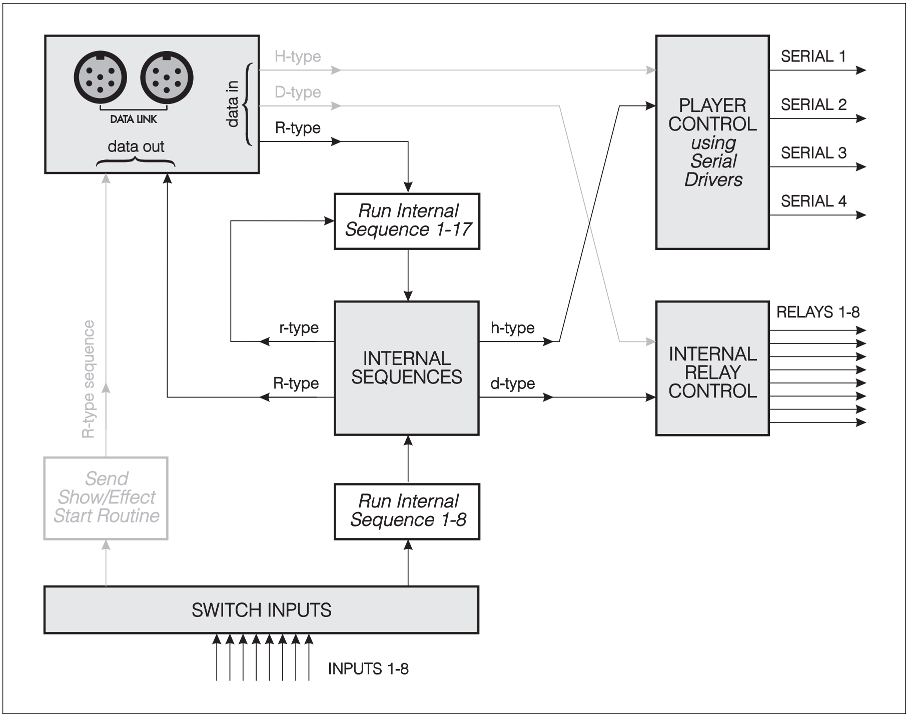


Fig.5-6: Internal sequence control options.

The ES1553 has 17 internal sequences to which one or more ‘cues’ can be assigned. The module has a storage capacity for up to a total of 112 cues which are *shared* between the 17 sequences.

Typically, sequences might be used to perform routine ‘house-keeping’ operations, *e.g.* ensuring players are at the correct starting positions, or to run simple ‘attractor’ shows.

Programming Internal Sequences

Internal sequence cues are created with the Four Disk Controller (FDC) software utility and then programmed into the ES1553 via the **DATA LINK** connector. The FDC software is supplied on the ESLINX Utilities Disk with full instructions; refer to Appendix H for further information.

Cue Format

Each internal sequence cue is stored as an ES4000 command of up to 24 characters (including all control characters, *i.e.* ^A, ^B, ^W and ^C).

In principle, any recognised ES4000 command format (of suitable length) may be used. However, cues will most commonly be used for the following functions:

- Control or set-up of the external players (*h-type commands*),
- Control of the internal relays (*d-type commands*),
- Start or stop another internal sequence (*r-type commands*),
- Load, start or stop an external show (*R-type commands*).

In addition, cues can be created which:

- Enable, disable or set-up the module’s switch inputs,
- Write to the module’s LCD display.

By default, internal sequence cues are only used by the module in which they are stored. However, they can also be programmed to be sent to the ‘data out’ terminal of the **DATA LINK** connector. This will normally be connected to the RX Line of a Ring and will allow, for example, an R-type (remote control) cue to be sent to the ‘bus master’ show computer, to start or stop a show.

Starting a Sequence

Internal sequences can be started in three ways:

- Using R-type commands from an ES1561 module (or show computer), or
- Using switch actions via the **INPUT 1-8** connector – *this method can only be used to start sequences 1 to 8,*
- Using the front panel Manual Start facility (see page 6-20) – *this method can only be used to start sequences 1 to 8.*

In addition, sequences can include cues which start (or stop) other sequences.

IMPORTANT NOTE
If required, two or more sequences are capable of running at the same time. However, perfect synchronisation between different sequences cannot be guaranteed in all circumstances.

Sequence 17 Auto-start

Sequence 17 can be started automatically when the module is powered-up or reset. This facility is controlled by the Start Delay setting in the Parameter Set-up menu (see page 6-16), which also specifies a delay before starting the sequence:

• **OFF**	*(do not run on power-up/reset)*
• **5s**	*(run after 5 seconds)*
• **15s**	*(run after 15 seconds)*
• **30s**	*(run after 30 seconds)*

IMPORTANT NOTE
The Start Delay setting can be temporarily overridden by pressing and holding the menu **SELECT** *button whilst the module is powered-up, until the message –* `Seq 17 no start` *– appears on the LCD screen.*

Starting a Sequence from an External Show

Internal sequences can be started using a variation of the R-type command format. Currently this ‘sequence start’ format of the R-type command can only be created using the transmittable comment/remark cue facility in **Cthrough+*Plus***, **EASY+** and **BSC**.

The following example will start sequence 5 on the module at Address 1:

```
^ARseq05^B0=^W^C
```

Further details on the special format R-type command are given on page I-27.

Starting a Sequence from a Switch Input

There are eight opto-isolated switch inputs provided on the **INPUT 1-8** connector. These are directly mapped to the first eight internal sequences, such that input 1 is used to run sequence 1, input 2 is used to run sequence 2, and so on.

To enable sequence start, the Def Seq parameter for the required input(s) must be correctly set using the Input Set-up menu (see page 6-9). This will have one of two settings:

• `None`	which means that sequence start is disabled, or
• a number (`01` to `08`)	which corresponds to the input/sequence number and means that the sequence will be started when the input is triggered.

For details on switch input connections and trigger conditions, refer to page 5-17.

> ***PROGRAMMING HINTS***
> *Although sequences 9 to 17 are not directly accessible via switch actions, these can, if required, be chained from sequences 1 to 8. For example, the last cue in sequence 1 could start sequence 9.*
>
> *By keeping a switch input active (i.e. in its 'triggered' state) the associated sequence will repeat continuously until the input is released. A cue can be programmed (using* 4-DISC*) which disables/enables sequence start from within the same (or another) sequence to avoid or exploit this feature as required.*

Remote Show Control

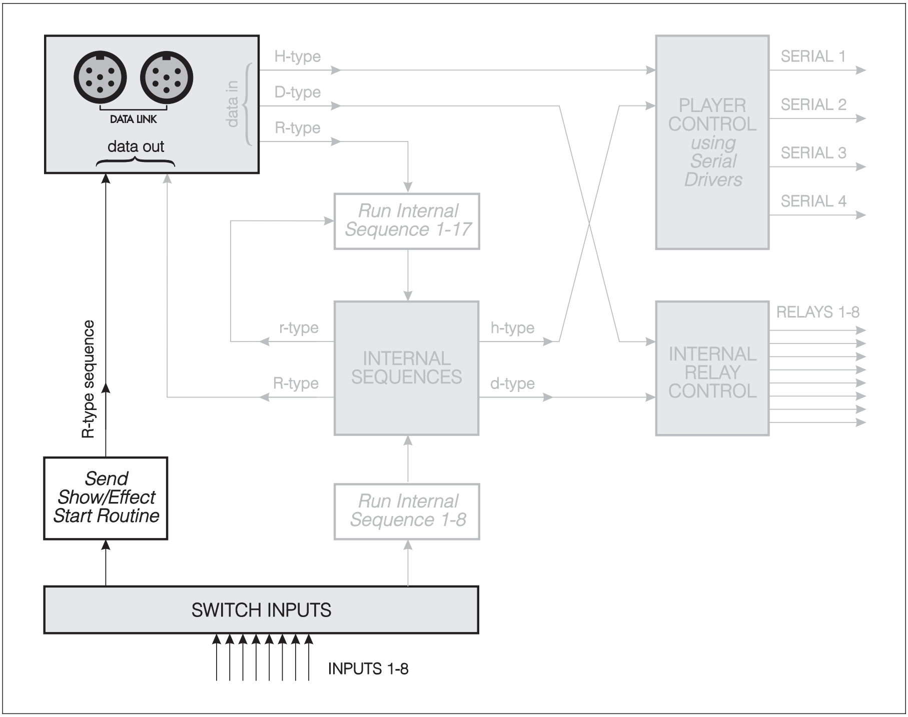


Fig.5-7: Remote show start using switch inputs.

The ES1553 module has two remote control routines — ‘Show Start’ and ‘Effect Start’ — which can be triggered via the switch inputs .

These routines transmit R-type commands (via the **DATA LINK** ‘data out’ terminal) which will run a show (or an effect) on an external ES1561 Show Control Module or show computer.

NOTE *Normally, the ‘data out’ terminal will be connected to the RX Line of the Ring and, therefore, can only be received by the ‘bus master’ (i.e. the ES1561 module or show computer) and* **not** *by other devices on the Ring.*

Show/Effect Start Routine

In a **Show Start Routine** six different R-type commands are transmitted, which perform the following tasks:

- stop, and remove the current show plus its effects (if any),
- specify the new show named as ‘SHOW*nn*’
  (where *nn* is a two digit number 01 to 64),
- load and run the new show.

In an **Effect Start Routine**, a single R-type command is transmitted which performs the following task:

- specify and run the effect named ‘EFFECT*nn*’
  (where *nn* is a two digit number 01 to 64).

PROGRAMMING HINT
Because the Show Start Routine has to delete an existing show and load the new show before actually running it, there will be a slight delay between the switch input event and the first show cue. In most installations this delay should not pose any problem.

If, however, a faster show start is required, it is possible with certain application programs to pre-load a number of shows as ‘effects’. It is then possible to use the Effect Start Routine which will start the show almost instantaneously. For further details on how to use this method of operation, refer to pages 9-13 to 9-14).

To enable a Show or Effect Start Routine, the Show parameter for the required input(s) must be correctly set in the Input Set-up menu (see page 6-9). This parameter can have one of three values:

- `None` show / effect start is disabled,
- `SHOW`*nn* show start is enabled (the displayed name, *e.g.* SHOW01 is the name of the show that will be loaded and run when the input is triggered,
- `EFFECT`*nn* effect start is enabled (the displayed name, *e.g.* EFFECT01 is the name of the effect that will be run when the input is triggered; (the effect must be pre-loaded).

In either case, the show / effect number (*nn*) is relative to the input number and the setting of the Show / Efct parameter in the Parameter set-up menu (see pages 6-16 and 6-9).

The routine is initiated by triggering one of the inputs on the **INPUT 1-8** connector. For details on switch input connections and trigger conditions, refer to page 5-17.

Switch Inputs

The eight opto-isolated switch inputs can be used for three purposes:

- Starting an Internal Sequence, or
- Triggering a Show Start Routine (to load & run an external show), or
- Triggering an Effect Start Routine (to run an external effect).

NOTE *If required, an external show (or effect) and internal sequence can both be started from the* ***same*** *switch input.*

The inputs are bi-directional and can, therefore, be used with common ground, common positive or low-voltage a.c. systems.

Fig.5-8 (on the next page) shows a typical method of connection using the internal +12 Volt supply. If an external power supply is to be used, the voltage applied to the input lines must be within the range ±5 to ±24V with respect to ‘common’.

Switch Input Polarity

Normally each input is triggered by a ‘negative’ voltage change. In Fig.5-8 this will occur when a switch is closed and the input voltage changes from 12V (nominal) to 0V.

If required, the input can be configured to respond to a ‘positive’ voltage change, *i.e.* the act of opening a switch will trigger the input.

This is defined using the Polarity parameter in the Input Set-up menu (see page 6-9) and should be set as follows:

- `Normal` input is triggered when switch closes (negative edge), or
- `Reverse` input is triggered when switch opens (positive edge).

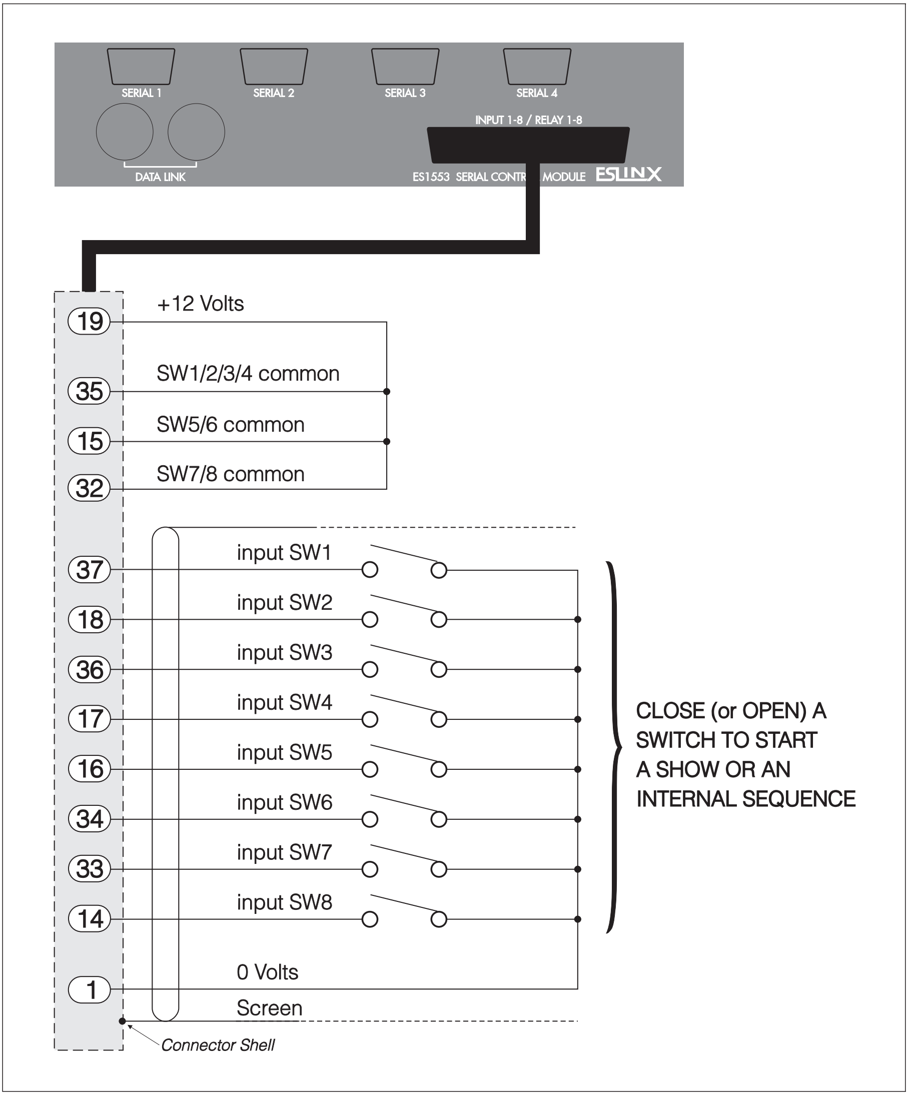
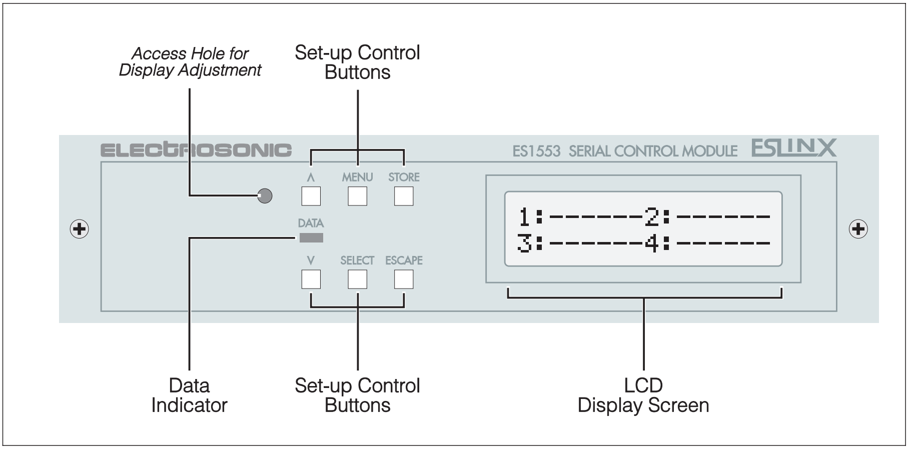


Fig.5-8: Typical method of using switch inputs.

Section 6:
ES1553 Set-up Procedures

Control Panel Overview



The front control panel includes the following controls which are used for viewing and changing the internal set-up parameters of the ES1553:

• **32-character LCD Display**	for displaying the various set-up menus and parameters.
• **6 Set-up Control Buttons**	for viewing and changing the various parameters.

User Interface

Data about the internal status and set-up parameters of the ES1553 are accessed and changed using the six push-buttons on the front panel. The current settings and the alternative options are displayed on the LCD screen via nine basic screens or ‘menus’:

- Player Status *(see page 6-4)*
- Player Set-up *(see page 6-5)*
- Player Control *(see page 6-7)*
- Input Set-up *(see page 6-9)*
- Output Set-up *(see page 6-12)*
- Sequence View *(see page 6-14)*
- Parameter Set-up *(see page 6-16)*
- Diagnostic View *(see page 6-18)*
- Manual Starts *(see page 6-20)*

When the Module has finished its initialisation sequence (after power-up), the display will default to showing the Player Status screen. To select a different screen / menu, press the **MENU** button or the ∧ and ∨ buttons (as shown in the table opposite).

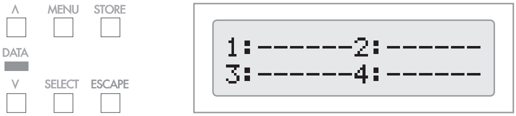
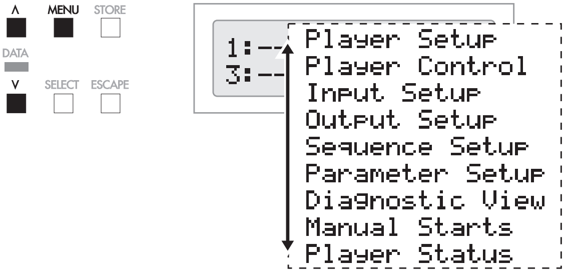
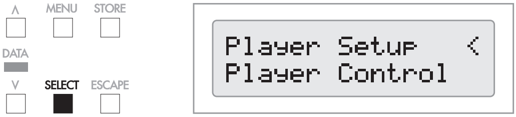
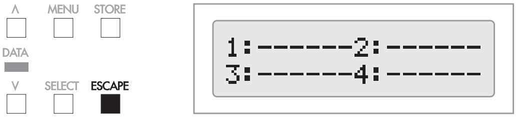
DATA Indicator

This indicator has two functions, each shown by a different colour:

- *Green* when a valid serial command is being received via the **DATA LINK** input.
- *Red* (flashing) when new settings are being saved in the internal memory following a **STORE** operation.

If both of the above actions occur simultaneously (or during initialistation) the indicator will appear orange in colour. At all other times the indicator will not be lit.

Selecting the Required Screen Mode (or Menu)

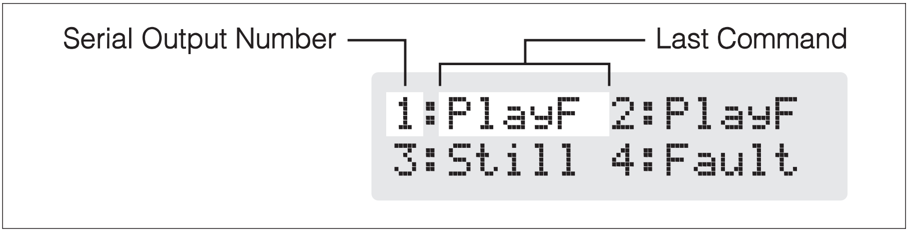
The ES1553 will default to the Player Status screen after power-up.	 ∧ MENU STORE DATA ∨ SELECT ESCAPE 1:------2:------ 3:------4:------
To step down through the available menu list, press the **MENU** or the ∨ button. To step up through the list, press the ∧ button. **Note**: *Pressing and holding a button will step through the options continuously until the button is released.*	 ∧ MENU STORE DATA ∨ SELECT ESCAPE 1:-- 3:-- Player Setup Player Control Input Setup Output Setup Sequence Setup Parameter Setup Diagnostic View Manual Starts Player Status
To select a particular screen mode or sub-menu, position the required option name on the top line of the display and press the **SELECT** button. ***OR*** To return to the Player Status screen, press the the **ESCAPE** button.	 ∧ MENU STORE DATA ∨ SELECT ESCAPE Player Setup < Player Control  ∧ MENU STORE DATA ∨ SELECT ESCAPE 1:------2:------ 3:------4:------

Basic Principle of Menu Operation

Each of the ES1553 menu screens use a similar method of operation:

- The **MENU**, ∧ or ∨ buttons are used to position the required menu option on the top line of the display (as indicated by the < character).
- The **SELECT** button is used to choose the displayed option and to go to the sub-menu(s) or set-up level.
- The **STORE** button is used to save a changed setting.
- The **ESCAPE** button is used to move back by one sub-menu level.

Player Status



```
1:PlayF 2:PlayF
3:Still 4:Fault
```

This is the ES1553 Module’s default screen mode.

It displays the last command transmitted to each of the four serial outputs (*i.e.* **SERIAL 1 – 4**). Certain types of serial driver also allow return messages from the player to be displayed (*e.g.* status information).

In the example above, the ‘`Fault`’ message on serial output 4 indicates that a command has been transmitted but an expected response has not occurred, *e.g.* a ‘Search to Frame’ command has failed. If this appears, you should check that the player is properly connected and powered, and that a disc or tape is loaded. Then perform a ‘Player / Fault Reset’ operation using the Player Control mode (see page 6-7).

At power-up, each player will be sent a ‘`Clear`’ command to remove any false information in its input buffer.

To change the Player type / driver, use Player Set-up mode.

Player Set-up

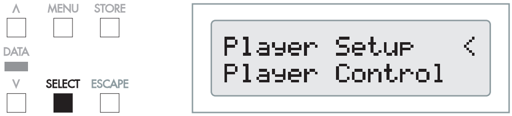
The Player Set-up menu is used to configure each serial output for the type of player being used. The following parameters exist for each player:

- **Driver Type:** this defines the protocol of the serial output and must be chosen to match the player being used (see Important Note below).
- **Baud Rate:** the communication speed of the serial link which may be one of the following values:
  1200
  2400
  4800
  9600
  19200
  38400
  57600
  76800
  115200
  Special *(used by Infra-Red drivers)*
- **Data Bits:** selectable as 8, 7, 6 or 5 bits.
- **Parity:** selectable as None, Odd or Even.
- **Communication Type:** the communication standard of the serial link which may be one of the following:
  RS-232
  RS-422
  RS-485
  IR *(Infra Red)*
- **Disc Type:** the data format of the laser disc being used which may be one of the following (not applicable to tape players):
  CAV *(Constant Angular Velocity)*
  CLV *(Constant Linear Velocity)*
- **Video Standard:** the video signal type being output by the player which may be one of the following:
  PAL *(50Hz – 25 frames per second)*
  NTSC *(60Hz – 30 frames per second)*

IMPORTANT NOTE
*Selecting a different Driver Type via the Player Set-up Menu will reset the other parameters (baud rate, comms type, etc.) to the default values defined by that driver; these can then be altered if required. For a full list of driver types (and default values) refer to Appendix E. Selecting a Driver with an H-type command will **not** reset the other parameters.*

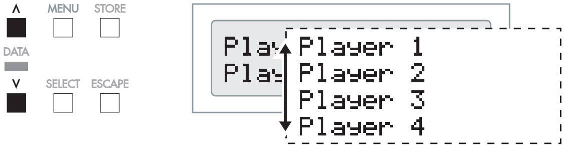
Changing the Player Set-up

1. Use the **MENU**, ∧ or ∨ buttons to position the Player Set-up option on the top line of the display, then press the **SELECT** button



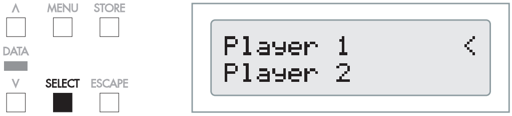
```
Player Setup   <
Player Control
```

2. From the list of player numbers,use the ∧ or ∨ buttons to position the required Player on the top line of the display, then press the **SELECT** button.



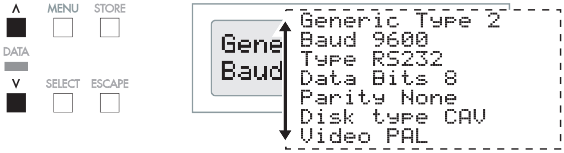
```
Player 1
Player 2
Player 3
Player 4
```

For example, 'Player 1':



```
Player 1       <
Player 2
```

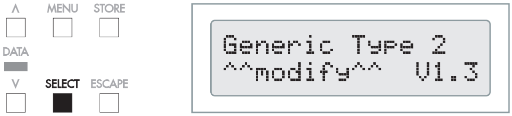
3. From the list of set-up parameters, use the ∧ or ∨ buttons to position the required parameter on the top line of the display, then press the **SELECT** button.



```
Generic Type 2
Baud 9600
Type RS232
Data Bits 8
Parity None
Disk type CAV
Video PAL
```

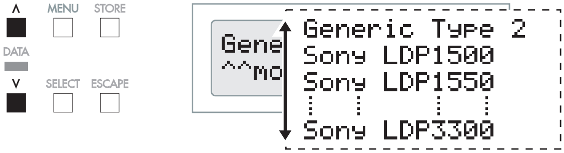
For example, 'Driver Type':

Note: *The '**V**' number on the right-hand side indicates the serial driver version.*



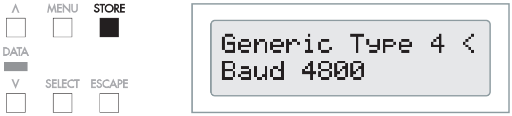
```
Generic Type 2
^^modify^^  V1.3
```

4. From the list of driver names, use the ∧ or ∨ buttons to position the required driver name on the top line of the display. (A full list of standard drivers is given on page E-1).



```
Generic Type 2
Sony LDP1500
Sony LDP1550
 ⋮    ⋮      ⋮    ⋮
Sony LDP3300
```

When the required driver is displayed, press the **STORE** button to store the setting.



```
Generic Type 4 <
Baud 4800
```

5. When a new serial driver is selected, the **Baud** Rate and Communications **Type** parameters will be set to the defaults defined within the serial driver (see page E-1).

To change these, return to step 3 and alter the appropriate parameter(s) using the same method; otherwise press the **ESCAPE** button three times to return to the Player Status screen.

Player Control

The ES1553 allows basic operating commands to be transmitted via each of the serial outputs. These are not intended to give full operational control of the connected players but are provided for basic testing and to check that the players are correctly responding to serial commands.

The following functions are available:

• `Index On`	(frame / time-code superimposed on video image)
• `Index Off`	(video image only)
• `PlayF`	(play forward - normal speed)
• `PlayR`	(play reverse - normal speed)
• `Still`	(still or pause)
• `FFwrd`	(fast wind forward)
• `Rewind`	(fast wind reverse)
• `Plyr/Flt Rst`	(perform a complete player reset)

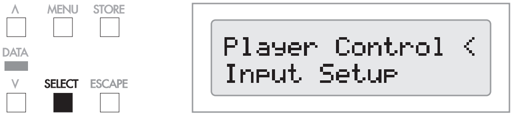
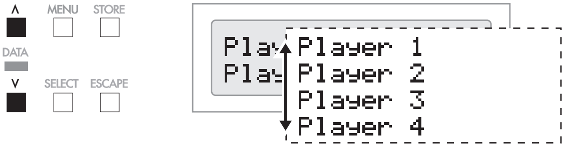
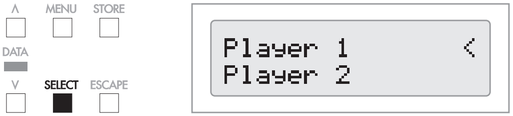
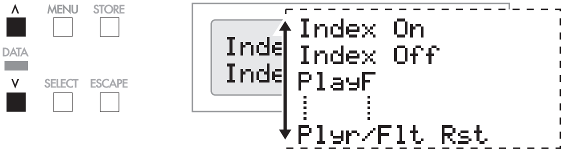
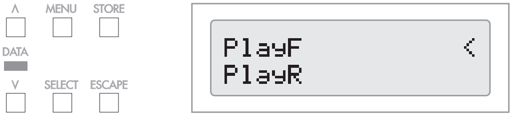
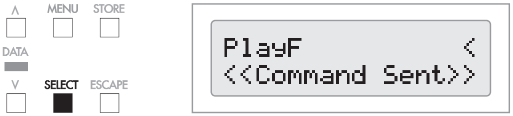
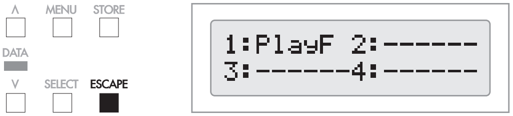
The option ‘labels’ displayed are those shown when the Language parameter (Parameter Set-up Menu – see page 6-16) is set to English. If, however, if the Symbol language option is chosen, the following command labels will be shown:

- `Index On`
- `Index Off`
- `>`
- `<`
- `...`
- `>>>`
- `<<<`
- `Plyr/Flt Rst`

IMPORTANT NOTE

The available functions remain the same regardless of the chosen language.

Sending a Player Command

1. Use the **MENU**, ∧ or ∨ buttons to position the Player Control option on the top line of the display, then press the **SELECT** button.	 Player Control < Input Setup
2. From the list of player numbers,use the ∧ or ∨ buttons to position the required Player on the top line of the display, then press the **SELECT** button. *For example, ‘Player 1’:*	 Player 1 Player 2 Player 3 Player 4  Player 1 < Player 2
3. From the list of control functions, use the ∧ or ∨ buttons to position the required function on the top line of the display. *For example, ‘Play Forward’:*	 Index On Index Off PlayF ⋮ ⋮ Plyr/Flt Rst  PlayF < PlayR
4. To send the command, press the **SELECT** button. *The* `<<Command Sent>>` *message will be displayed for approximately 1 second.*	 PlayF < <<Command Sent>>
5. Press the **ESCAPE** button three times to return to the Player Status screen. *If the command was sent successfully, it will be displayed next to the appropriate player.*	 1:PlayF 2:------ 3:------4:------

Input Set-up

This mode is used to view the current status of the switch inputs and to gain access to the various switch parameters:

- **Show** This parameter allows a show or effect to be started within an ES1561 or show computer, when a switch input is triggered.

`None`	*(default setting - do nothing)*
`SHOW`*nn*	send Show Start Routine for this show name.
`EFFECT`*nn*	send ‘Run Effect’ R-type for this effect name.

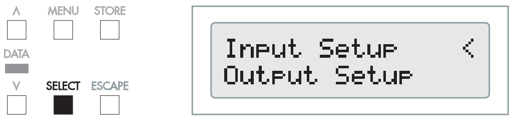
The number *nn* varies accordingto the ‘Show / Efct’ parameter (see page 6-16) and the input number as in the table below:

‘Show/Efct’ Option		**Switch Input Number**							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
01 – 08	values of *nn*	01	02	03	04	05	06	07	08
09 – 16		09	10	11	12	13	14	15	16
17 – 24		17	18	19	20	21	22	23	24
25 – 32		25	26	27	28	29	30	31	32
33 – 40		33	34	35	36	37	38	39	40
41 – 48		41	42	43	44	45	46	47	48
49 – 56		49	50	51	52	53	54	55	56
57 – 64		57	58	59	60	61	62	63	64

- **Def Seq** This parameter allows a switch input to trigger an internal sequence. When set to `None`, no trigger occurs. Otherwise the parameter shows a number (`01` to `08`) which corresponds to the input number and the sequence that it will trigger.
- **Polarity** Defines whether the input responds to switch *closure* (`Normal`) or *opening* (`Reverse`).
- **Override** Allows the current input condition to be overridden, or to be activated when no input is connected, *e.g.* for testing purposes. For further details, refer to page 6-11.

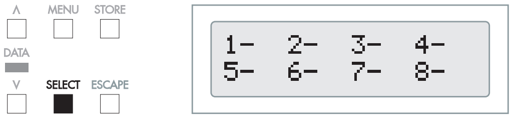
Changing the Input Set-up

1. Use the **MENU**, ∧ or ∨ buttons to position the Input Set-up option on the top line of the display, then press the **SELECT** button.

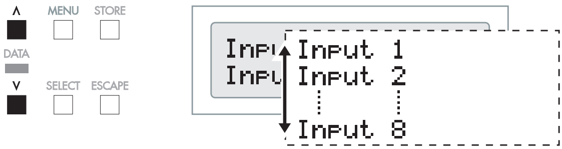


The Input Status screen will be displayed (see page 6-11).

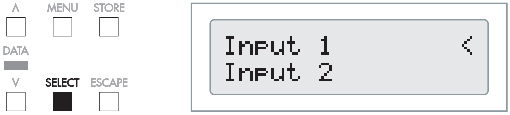
Press the **SELECT** button again to open the set-up menu.



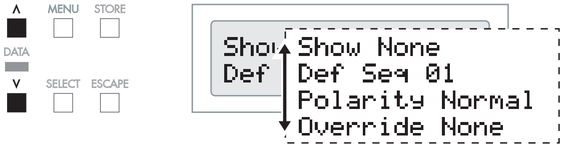
2. From the list of input numbers,use the ∧ or ∨ buttons to position the required input on the top line of the display, then press the **SELECT** button.



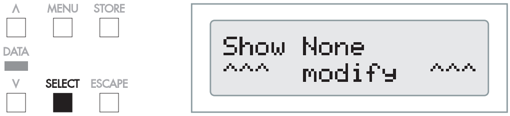
For example, 'Input 1':



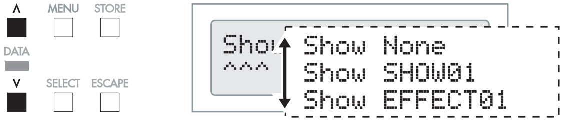
3. From the list of input parameters, use the ∧ or ∨ buttons to position the required parameter on the top line of the display, then press the **SELECT** button.



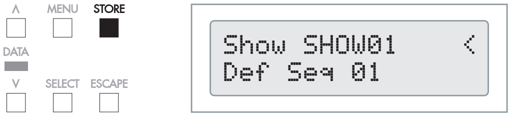
For example, 'Show':



4. Use the ∧ or ∨ buttons to alter the displayed setting.



5. Press the **STORE** button to accept the new setting.



Repeat steps 3, 4 & 5 to change any of the other input parameters.

Using the Override Function (Input Test)

This function is controlled via the Override parameter within the Input Set-up mode. To use this function, follow steps 1, 2 & 3 listed on page 6-10 to ‘select’ the Override parameter.

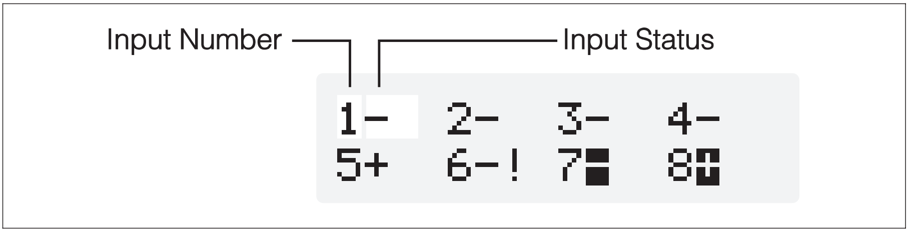
Use the ∧ or ∨ buttons to choose one of the following options:

- `None` override function is disabled (default).
- `Off` Input held in open circuit condition.
- `On` Input held in closed circuit condition.

Press the **STORE** button to invoke the chosen override condition; (note that the **DATA** indicator will not flash for this operation). **IMPORTANT – Any show start or sequence start associated with the input will be triggered.**

An On or Off override condition will remain in place until changed or until you **ESCAPE** from the Input Status screen (to the main menu list).

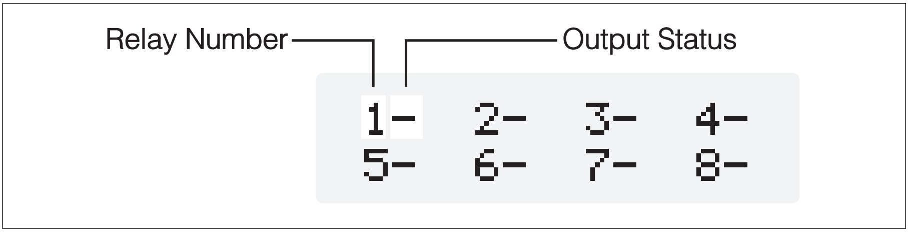
The Input Status Screen



This screen shows the status of the eight switch inputs (numbered 1 to 8). One or two symbols appear against each input number to indicate its current condition or status:

− = Input is open circuit *(as inputs 1,2,3, 4 & 6 above),*
+ = Input is closed circuit *(as input 5 above)*
⊟ = Input has `Override Off` condition applied *(as input 7 above)*
⊞ = Input has `Override On` condition applied *(as input 8 above)*
! = Input Polarity is set to `Reverse` *(as input 6 above)*

Output Setup (internal relays)



```
1-   2-   3-   4-
5-   6-   7-   8-
```

This screen shows the current state of the eight internal relays (identified as 1 to 8). The symbol against each relay number indicates its current condition or status:

- – Relay Off (default condition):
  Contact Com and NC are closed; Com and NO are open.
- + Relay On:
  Contact Com and NO are closed; Com and NC are open.

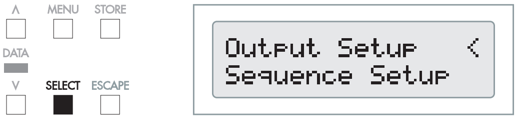
The On / Off condition of each relay is controlled by an ES4000 D-type command either via the **DATA LINK** ring or from an internal sequence. In addition, an override function is provided to test the operation of each relay and any associated external circuitry.

WARNING
If the relay outputs are connected to peripheral devices, take care not to endanger any personnel when using the Output Override function.

Also be careful not to jeopardize system integrity by operating peripheral devices 'out of sequence'.

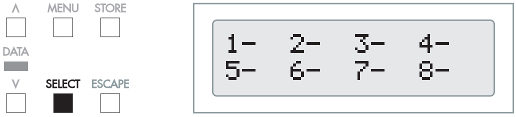
Using the Override Function (Relay Test)

1. Use the **MENU**, ∧ or ∨ buttons to position the Output Set-up option on the top line of the display, then press the **SELECT** button.



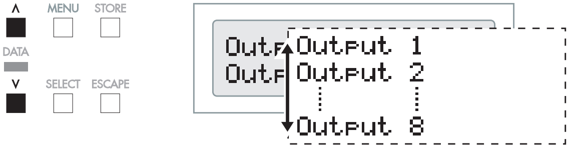
```
Output Setup   <
Sequence Setup
```

The Output Status screen will be displayed (see page 6-12).
Press the **SELECT** button again to open the set-up menu.



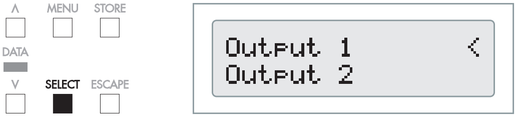
```
1-  2-  3-  4-
5-  6-  7-  8-
```

2. From the list of output numbers,use the ∧ or ∨ buttons to position the required output on the top line of the display, then press the **SELECT** button.



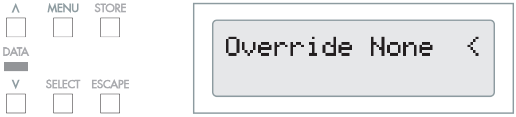
```
Output 1
Output 2
  :     :
Output 8
```

For example, ‘Output 1’:



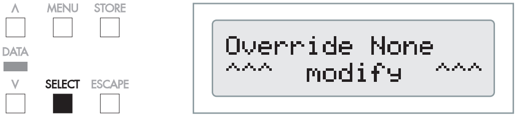
```
Output 1       <
Output 2
```

3. The Override function is the only option available.



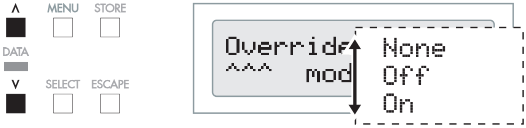
```
Override None  <
```

Press the **SELECT** button to enable the setting to be changed.



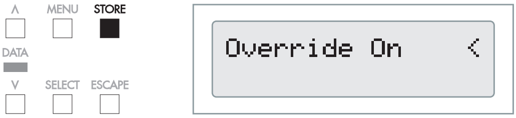
```
Override None
^^^  modify  ^^^
```

4. Use the ∧ or ∨ buttons to alter the displayed setting.



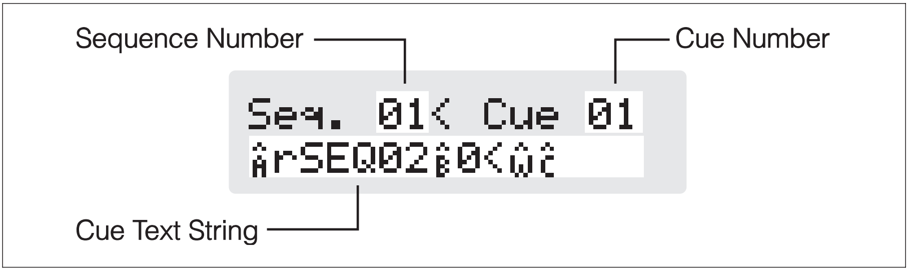
```
Override None
^^^  mod Off
         On
```

5. Press the **STORE** button to accept the new setting.



```
Override On    <
```

Sequence View



This mode is used to view the 17 internal cue sequences currently held within the ES1553 memory. Cues cannot be programmed or changed using this screen – this can only be done using the 4-DISC software utility (refer to Appendix H for further details).

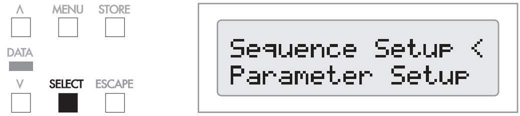
Each cue takes the form of an ES4000 protocol command and is displayed in the form of an ASCII text string. The above example shows an r-type command that will cause internal sequence 2 to stop.

If there are no cues associated with the selected sequence number, the cue number field will show '`00`' and the message '`No cues in seq.`' will appear in the cue text area of the display.

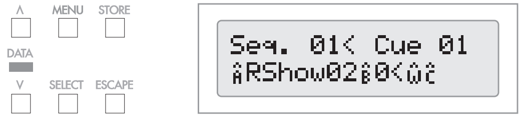
NOTE *In the unlikely event that a Sequence contains more than 99 Cues, only the first 99 Cues can be viewed on the display.*

Viewing the Internal Sequences

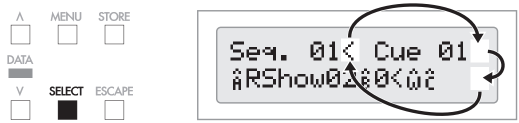
1. Use the **MENU**, ∧ or ∨ buttons to position the Sequence Setup option on the top line of the display, then press the **SELECT** button.



2. The Sequence View screen will then appear.

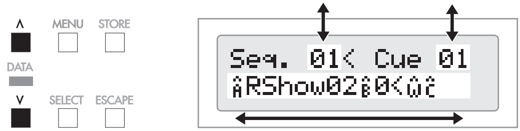


3. Press the **SELECT** button to move the move the cursor (<) between the three display fields.



For the 'selected' field:

use the ∧ or ∨ buttons to change the sequence or cue number. If the cue text is longer than 15 characters, also use these buttons to scroll the text left or right.



Parameter Set-up

This menu allows access to the following parameters which are used to define the general set-up of the ES1553 module:

- **Address** used to uniquely identify the module for the purpose of ES4000 serial communications — it does not affect any other aspect of the module's operation. This parameter can be set to any value from `01` to `24` (default = `01`); duplicate addresses ***must not*** exist on the same ring.
- **Start Delay** defines whether or not internal sequence 17 is to be started automatically on power-up or reset, and if so, the amount of delay to be applied:

`None`	*(sequence is not called)*
`5s`	*(sequence is called after 5 seconds)*
`15s`	*(sequence is called after 15 seconds)*
`30s`	*(sequence is called after 30 seconds)*

- **Baud** defines the ES4000 (RS-232) baud rate to be used:

`19200` (*default*)	`57600`	`115200`
`38400`	`76800`	

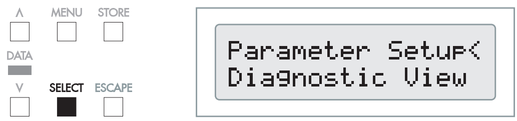
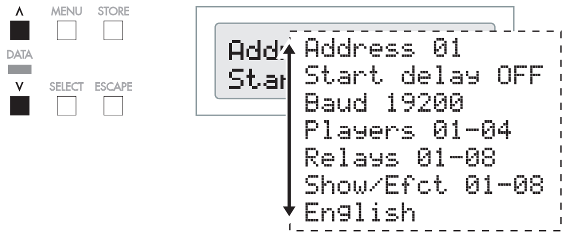
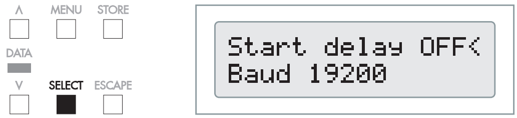
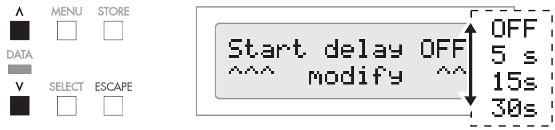
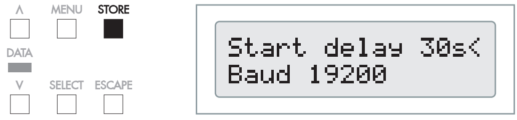
NOTE: *All of the settings use 8 data bits with even parity.*

- **Players** sets the range of the four serial control ports. By default these are configured as players `01-04`, but can be changed to subsequent blocks of four players (*e.g.* `05-08`, `09-12`, *etc.*) up to `21-24`.
- **Relays** sets the range of the eight internal relays. By default these are configured as relays `01-08`, but can be changed to subsequent blocks of eight relays (*e.g.* `09-16`, `17-24`, *etc.*) up to `89-96`.
- **Show/Efct** sets the range of 'shows' (or 'effects') that can be called by the Show Start routine. By default these are configured as shows `01-08`, but can be changed to subsequent blocks of eight shows (*e.g.* `09-16`, `17-24`, *etc.*) up to `57-64`.

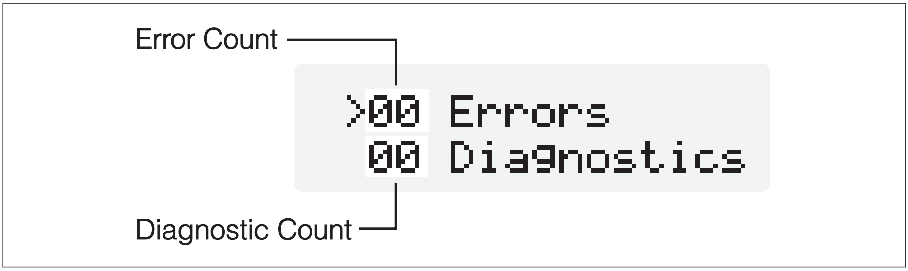
- **Language** defines how serial commands are displayed within menus and on the Player Status screen:
  `English` *commands displayed as words (default).*
  `Symbols` *commands displayed as graphics.*

  This setting does not affect messages generated by an external ES1561 Show Control Module or show computer.

Changing the Module Set-up Parameters

1. Use the **MENU**, ∧ or ∨ buttons to position the Parameter Set-up option on the top line of the display, then press the **SELECT** button.	 Parameter Setup< Diagnostic View
2. From the list of module parameters, use the ∧ or ∨ buttons to position the required parameter on the top line of the display.	 Add Star Address 01 Start delay OFF Baud 19200 Players 01-04 Relays 01-08 Show/Efct 01-08 English
3. Press the **SELECT** button to edit the displayed setting. *For example, 'Start Delay':*	 Start delay OFF< Baud 19200
4. From the list of options, use the ∧ or ∨ buttons to position the required setting on the top line of the display.	 Start delay OFF ^^^ modify ^^ OFF 5 s 15s 30s
5. When the required setting is displayed, press the **STORE** button. *To retain the original setting, press the* **ESCAPE** *button.*	 Start delay 30s< Baud 19200

Diagnostic View



```
>00 Errors
 00 Diagnostics
```

This screen shows if any operational problems have occurred. If the ES1553 encounters an abnormal operating condition or an incorrect configuration, a 3-digit code is generated which can be cross-referred to the details given in Appendix G.

A code is classified as being in one of the following groups:

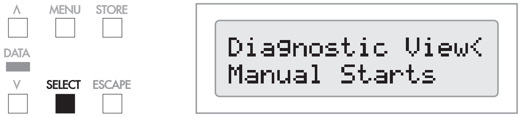
- **Error** which warns of a problem that will potentially disrupt the correct operation of the module. If a code occurs within this group, the **DATA** indicator will show red continuously.
- **Diagnostic** which is for ‘advice only’ and will not usually affect operation. These generally occur as the result of incorrect set-up or incompatibility problems. However, certain codes will *always* occur, even during normal operation.

When a code is generated, it will increment the count next to the appropriate code group on this screen. A record of the code(s) is held in memory and can be viewed separately. Further occurrences of the *same* code will not increment the group counter but will be recorded internally (up to a maximum of 255 occurrences).

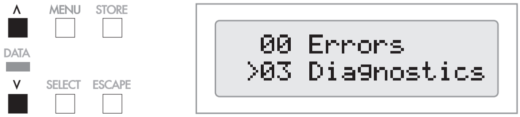
Turning the module off causes any stored codes to be cleared and the counters to reset to 00.

Viewing & Clearing Diagnostic Codes

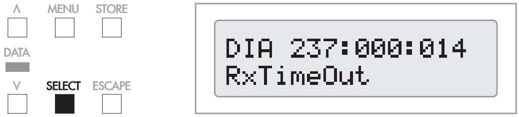
1. Use the **MENU**, ∧ or ∨ buttons to position the Diagnostic View option on the top line of the display, then press the **SELECT** button.



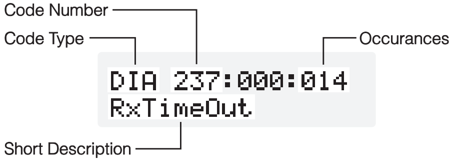
2. The Group Count screen will then appear. Use the ∧ or ∨ buttons to position the cursor (>) against the Error or Diagnostic group.



3. Press the **SELECT** button to view the first code in the group.

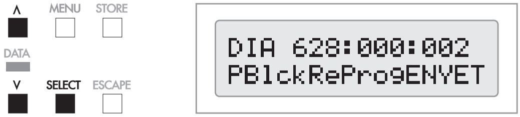


Refer to Appendix G for code listings, descriptions and troubleshooting guide.

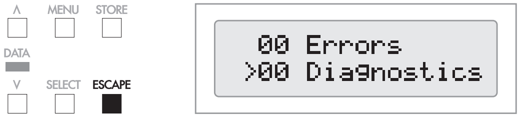


4. If there is more than one code, use the ∧ or ∨ buttons to scroll through the list.

To clear the displayed code, press the **SELECT** button.



5. When all the codes have been cleared, the display will revert to the Group Count screen. (To revert to this screen without clearing any codes, press **ESCAPE**.)



Manual Starts

This menu allows an external show (or effect) or an internal sequence to be started by using the ES1553 module's own control panel, rather than by using the switch inputs. This facility is primarily intended to be used for testing.

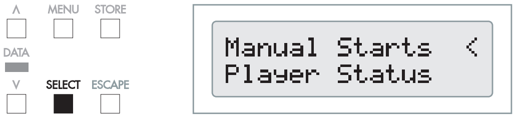
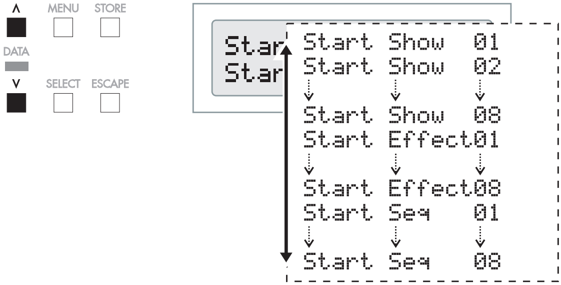
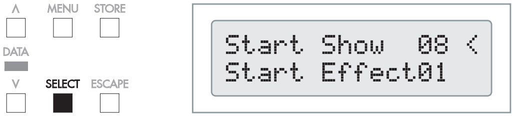
Selecting a 'Start Show' option will initiate a Show Start Routine (see page 5-14) for the appropriate show. This allows one of eight shows to be started provided that they are named using the **SHOW***nn* convention.
The range of shows offered (*i.e.* **SHOW01** to **SHOW08**, **SHOW09** to **SHOW16**, *etc.*) is dependant on the setting of the Show / Efct parameter in the Parameter Set-up menu (see page 6-16).

Selecting a 'Start Effect' option will transmit a 'Start Effect' R-type command for the chosen Effect name (*i.e.* **EFFECT01**, **EFFECT02**, *etc.*). As with the Start Show option, the range of Effects is dependant on the setting of the Show / Efct parameter in the Parameter Set-up menu (see page 6-16).

NOTE *The 'Start Effect' option only applies to firmware version 1.2 and above.*

Selecting a 'Start Seq' option will trigger one of the Internal Sequences. Only sequences 01 to 08 are available for manual start.

Manually Starting a Show or Sequence

1. Use the **MENU**, ∧ or ∨ buttons to position the Manual Starts option on the top line of the display, then press the **SELECT** button.	 Manual Starts < Player Status
2. From the list of show and sequence start options, use the ∧ or ∨ buttons to position the required option on the top line of the display. **Note:** *The range of show numbers displayed depend on the Shows parameter in the Parameter Set-up Menu. Sequence numbers will always be 01 to 08.*	 ∧ MENU STORE DATA ∨ SELECT ESCAPE Star Star Start Show 01 Start Show 02 Start Show 08 Start Effect01 Start Effect08 Start Seq 01 Start Seq 08
3. To start the show or sequence, press the **SELECT** button. *The message* <<Start Sent>> *will be displayed briefly on the bottom line of the display.*	 Start Show 08 < Start Effect01

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Section 7:
ES1554 Configurations

The diagram below illustrates the main functional blocks within the ES1554 Digital Input / Output Module plus their related control inputs and outputs:

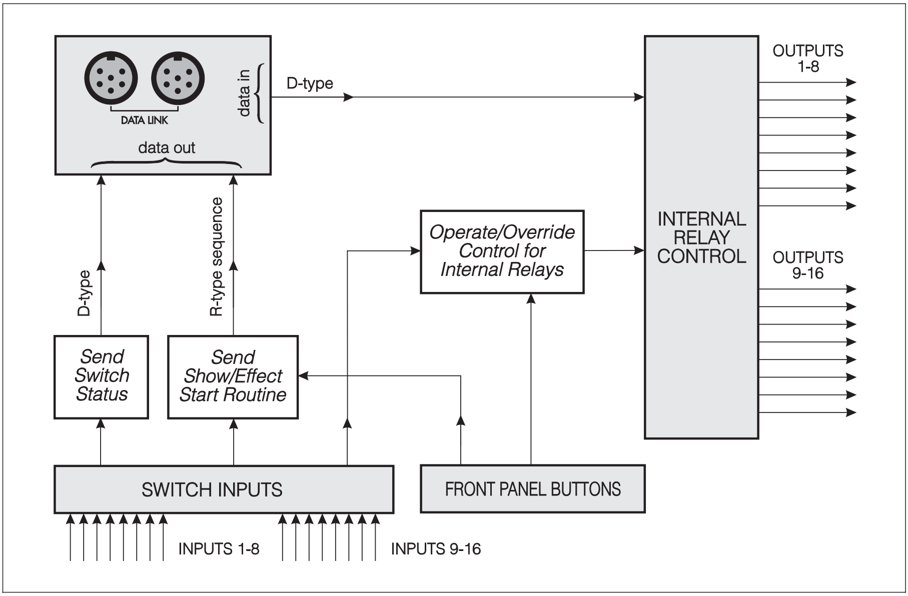


Fig.7-1: Block diagram of ES1554 functions & control.

This section provides details on the basic operating configurations which can be used to control the relays and provide external show control.

In practice, a combination of these configurations may be used at the same time.

Relay Control

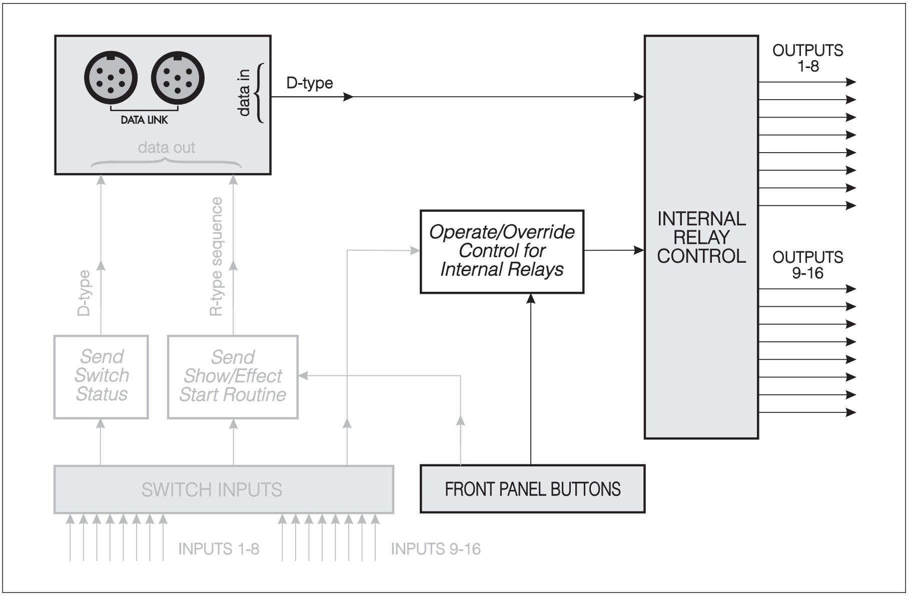


Fig.7-2: Relay control options.

The sixteen internal relays can be controlled by using:

- an **external ES1561 Show Control Module** or show computer (using the D-type command format),
- the **relay override buttons** on the module's front panel, or
- the module's **switch inputs** (*see page 7-12 for more details on this option*).

Controlling Relays from an External Show

The ‘relay control’ functions provided by Electrosonic’s **Cthrough+*Plus***, **EASY+** and **BSC** application programs automatically generate the required D-type commands.

Alternatively, customised D-type commands may be created in the above applications by utilising transmittable comment or remark cues. Further details on the D-type command format are given on page I-4.

The application program (and show) is run either on a separate ES1561 module or show computer, and transmits control commands to the ES1554 module via the **DATA LINK** connector (as shown in Fig.7-3 on page 7-7).

Since the D-type command can support up to 96 relays (depending on the limits of the application program), it is necessary to define which ‘block of sixteen’ are assigned to the **OUTPUTS 1 – 16**. This is governed by the ‘Address’ setting (see page 8-4).

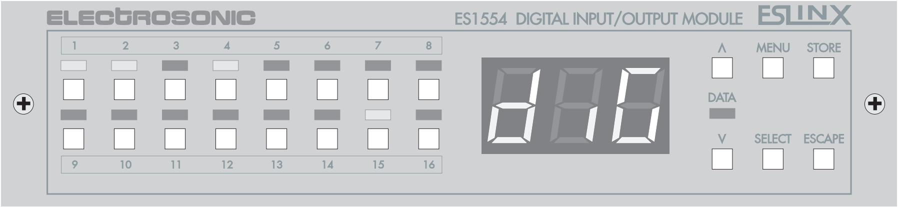
Extended D-type Commands

The standard D-type command controls relays in groups of four and all relays within that group will be forced to an On / Off state. In the various application programs, all relays are forced to an Off condition when a new show is loaded. The application then maintains an on-going status for each relay throughout the show as each (D-type) Relay cue is encountered.

When using transmittable comment cues to control relay operation, the current status of relays may not be known. You may also require the state of one or more relays in a show to be variable according to an unpredictable event (*e.g.* user interaction).

The ES1554 can use an extended form of the D-type command which allows selected relays to be ‘enabled’. This means that a specific relay(s) can be made to operate independently of the others in its group of four. Currently this extended D-type command can only be created using the transmittable comment / remark cue facility in **Cthrough+*Plus***, **EASY** and **BSC**. Further details on the extended D-type command format are given on page I-6.

Front Panel Buttons



The sixteen push-buttons on the ES1554 module’s front panel (to the left of the digital display) are provided for the following relay control functions:

- manual operation of each relay, and / or
- enabling / disabling ES4000 serial control (via the **DATA LINK** connector)

Manually Operating a Relay

☞ Press the corresponding button to toggle the relay state from OFF to ON or ON to OFF; the current state is shown by the indicator above the button:

- *unlit* = relay OFF,
- *fully lit* = relay ON.

WARNING
If the relay outputs are connected to peripheral devices, take care not to endanger any personnel when using the Relay Override buttons.

Also be careful not to compromise system integrity by operating peripheral devices 'out of sequence'.

To prevent accidental operation of the Relay Override buttons, they can be 'locked-out' by the module's menu system – see page 8-8.

Disabling ES4000 Serial Control

☞ Press and hold the corresponding button (for at least two seconds) until the indicator starts flashing; this shows that the relay is now disabled for ES4000 control.

The relay can still be operated by briefly pressing the button. The relay state is shown by the indicator being predominately ON or OFF whilst still flashing.

☞ To re-enable serial control, press and hold the corresponding button (for at least two seconds) until the indicator stops flashing.

Relay Operation & Connections

The state of each relay is defined as follows:

- **Off** contact Com makes with NC,
- **On** contact Com makes with NO.

All relays are set to their previously saved state at power-up.

Electrical connection to the relay contacts is achieved via the **RELAYS 1-8** and **RELAYS 9-16** connectors, as shown in Fig.7-3.

Each relay is capable of switching up to 50V d.c. or 24V a.c. @ 200mA.
For full technical details, refer to page B-6.

WARNING
*These relay contacts are **not** safety isolated and are **not suitable for mains voltage operation.***

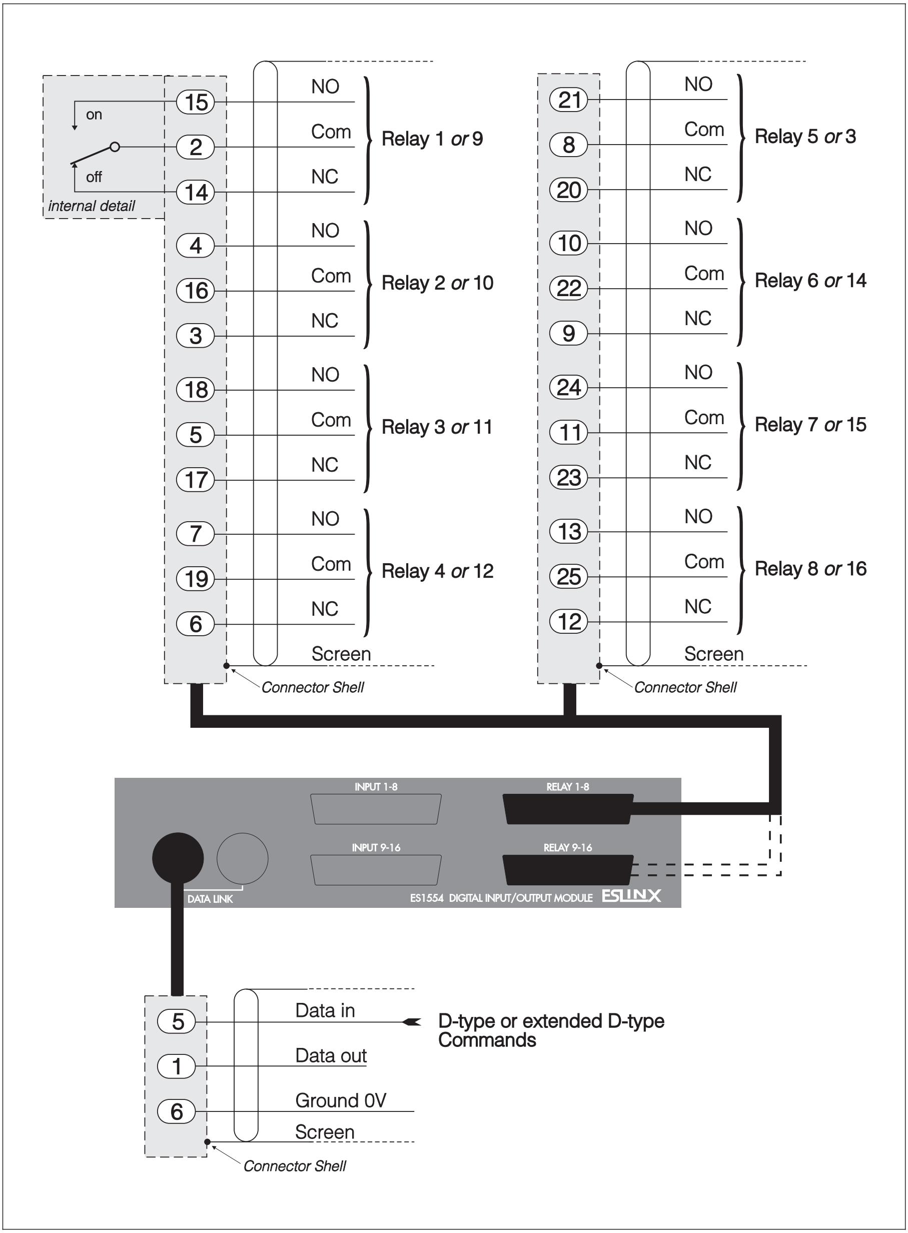


Fig.7-3: Connections for the internal relays.

Remote Show Control

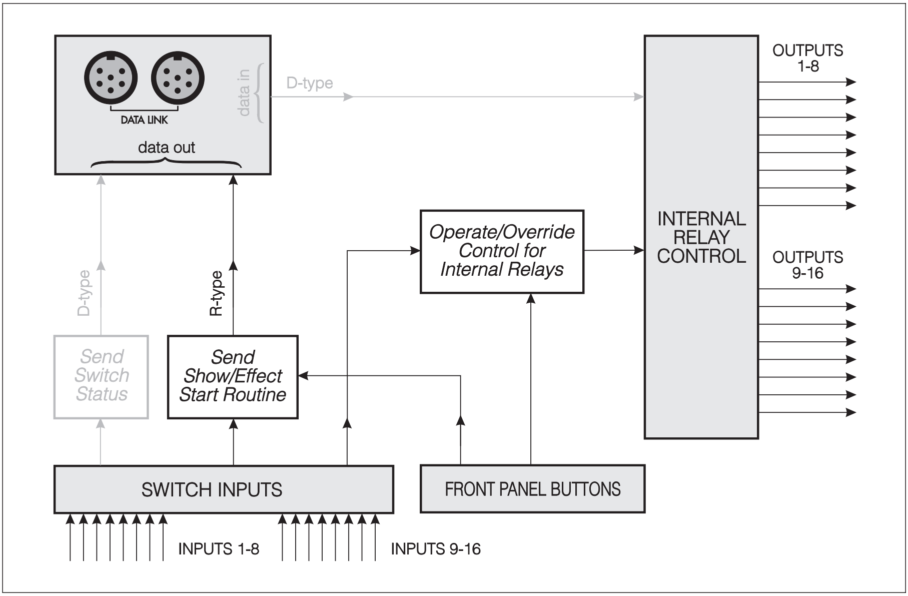


Fig.7-4: Remote control options.

The ES1554 module has various remote control routines which can be triggered via the switch inputs or front panel buttons.

These routines transmit R-type commands (via the **DATA LINK** ‘data out’ terminal) which will run a show (or an effect) on an external ES1561 Show Control Module or show computer.

NOTE *Normally, the ‘data out’ terminal will be connected to the RX Line of the Ring and, therefore, can only be received by the ‘bus master’ (i.e. the ES1561 module or show computer) and **not** by other devices on the Ring.*

Show/Effect Start Options

The ES1554 provides three different show start options (as well as ‘no show start’) for use with different application programs or equipment. The required option is selected with the Show Control Options Menu as described on page 8-11:

Input/Button Action	R-type(s) Transmitted	Relay Operation
Ancor — Anc Primarily intended for use with Ancor applications. Relay operation via ES4000 control is disabled with this setting.		
Button 1–8 pressed *or* Input 1–8 activated...	`^ARSHOWxx^BO=^W^C` (*Start Show*)	Relay *xx* ON
Button 9–16 pressed *or* Input 9–16 activated...	`^ARSHOWxx^BO<^W^C` (*Stop Show*)	Relay *xx* OFF
Videowall Control Unit — ucU Primarily intended for use with ES5503/4 VCU’s running shows created with EASY+ or Cthrough+*Plus*. Relay operation by front panel buttons, switch inputs or ES4000 control is disabled with this setting.		
Button 1–16 pressed *or* Input 1–16 activated...	`^AREFFECTxx^B07^W^C` (*Start Effect*)	—
ESLINX — ALL Provides full compatibility with different application programs by using the ESLINX Show Start Routine comprising 6 R-types (see page I-26). Relay operation by front panel buttons, switch inputs and ES4000 control is disabled with this setting.		

Button 1–16 pressed *or* Input 1–16 activated...	`^AR^BO<^W^C`
	`^AR^B09^W^C`
	`^AR^BO:^W^C`
	`^ARSHOWxx^B04^W^C`
	`^AR^B08^W^C`
	`^AR^BO=^W^C`
		—

For details on switch input connections and trigger conditions, refer to page 7-13.

For further details about the R-type command, refer to page I-24 onwards.

IMPORTANT NOTES

In each of the preceding examples, the value ‘xx’ represents the button or input number 01 to 16 being used. Thus the show (or effect) must be named using the convention SHOW01, SHOW02, SHOW03, (or EFFECT01, EFFECT02, EFFECT03) etc. The ‘xx’ value is not affected by the ES1554 module’s Address setting.

When using the front panel buttons, R-type transmission/relay operation occurs as the button is released.

R-type commands are only generated whilst the chosen setting is on the display; this display mode does not revert to the default after 15 seconds.

Special Control Options

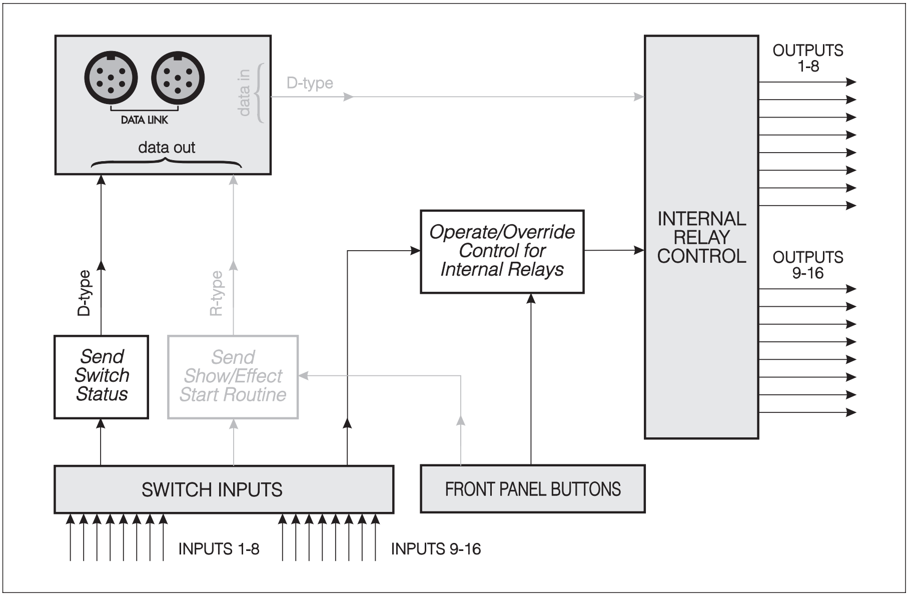


Fig.7-5: Special control options.

The ES1554 module has the ability to transmit the status of its switch inputs in the form of a standard D-type command (via the ‘data out’ terminal of the **DATA LINK** connector). This is primarily intended for applications where two ES1554 modules are connected ‘back-to-back’ such that one can be used to control the other.

The switch inputs can also be used to directly control the operation of the internal relays.

NOTE *The front panel buttons can still be used to provide manual relay operation as described on page 7-5.*

For details on switch input connections and trigger conditions,
refer to page 7-13.

Transmitting Switch Input Status

The ES1554 provides two options for the transmission of switch input status. In either case, the state of all inputs is encoded into a conventional D-type command and sent to the ‘data out’ terminal of the **DATA LINK** connector:

- **Poll** a D-type command is sent only when a QD-type command is received via the ‘data in’ terminal of the **DATA LINK** connector. (*Refer to page I-31 for details of the QD-type command format*.)
- **Interrupt** a D-type command is sent every time an input changes state.

The required option is selected via the Input Response Menu as described on page 8-9.

IMPORTANT NOTE
If the ES1554 module is configured to transmit both a Show Start command and input status information, the Show Start command is transmitted first.

Relay Operation using Switch Inputs

The internal relays can be operated directly by using the switch inputs, with input 1 controlling relay 1, input 2 controlling relay 2, and so on.

When an input is inactive, its corresponding relay will be ‘Off’; when the input is made active, the relay will turn ‘On’.

This method of operation is selected by choosing the **Relay** option via the Input Response Menu as described on page 8-9.

Switch Inputs

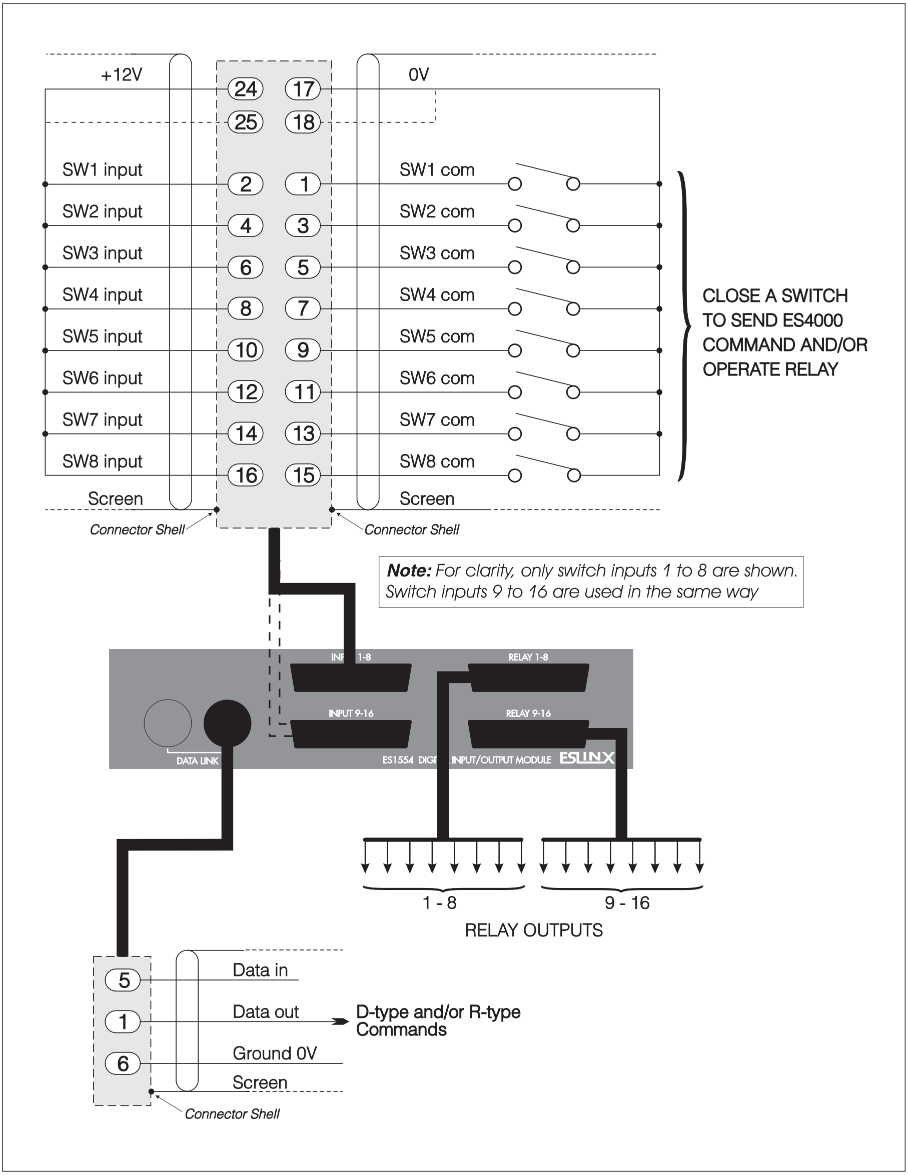
The sixteen switch inputs can be used for three purposes as described earlier:

- triggering a Show Start (R-type) command,
- sending an input status (D-type) command, or
- operating an internal relay.

The switch inputs SW1 to SW16 are available in two groups of eight via the **INPUT 1-8** and **INPUT 9-16** connectors.

Each input is opto-isolated and has two terminals; to activate a particular input, connect its ‘input’ terminal to 12V (pin 24 or 25) and its ‘com’ terminal to 0V (pin 17 or 18). Each input is protected against reverse polarity.

Fig.7-6 (on the next page) shows a typical method of connecting the inputs using the internal 12 Volt supply via mechanical switches. Note that the ‘input’ or ‘com’ side of several inputs may be ‘commoned’. Alternatively, the inputs can be directly driven from a digital output device.

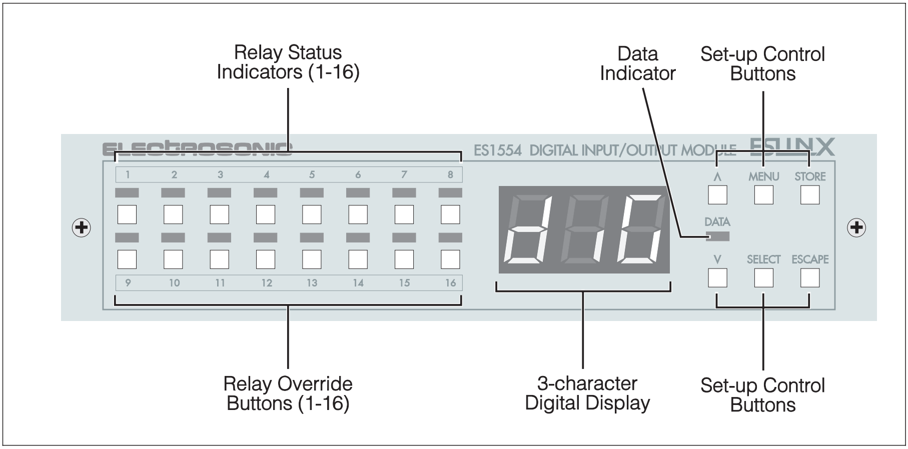


Note: *For clarity, only switch inputs 1 to 8 are shown. Switch inputs 9 to 16 are used in the same way*

Fig.7-6: Typical method of using switch inputs.

Section 8:
ES1554 Set-up Procedures

Control Panel Overview

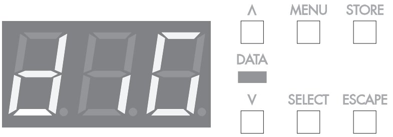


The front control panel comprises the following buttons and indicators which are used for viewing and changing the ES1554 module's internal set-up parameters:

• **3-character Digital Display**	for displaying the various set-up menus and parameters.
• **6 Set-up Control Buttons**	for viewing and changing the various parameters.
• **16 Relay Override Buttons**	for manually operating each relay or disabling RS-232 control.
• **16 Relay Status Indicators**	which show the 'On / Off' or the 'enabled / disabled' state of each relay.

Select the Menu/Set-up Mode

With the default display showing, press the **MENU** button to step forward to the next display mode.



The firmware version will now be displayed.

Repeatedly press the **MENU** button to step through the other display modes:

Address Mode... Address Number

Bank Number

Serial Set-up Mode... Baud Rate

Parity

Data Bits

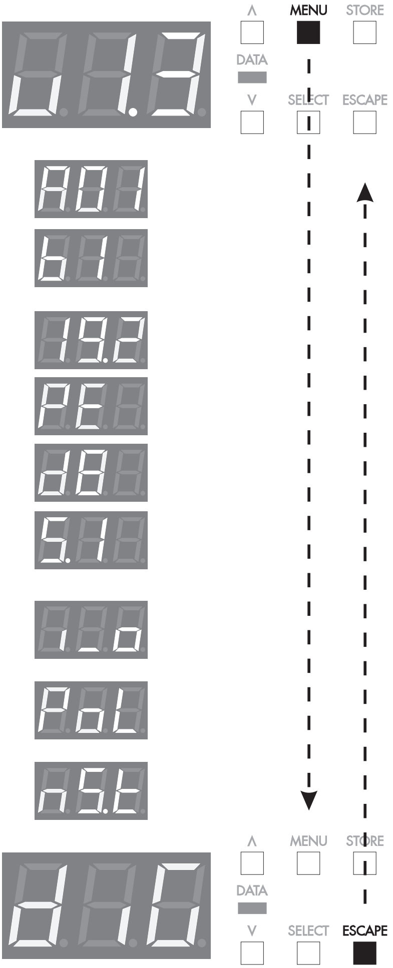
Stop Bits

Button Lock/Unlock Mode...

Input Response Mode...

Show Control Options...

...and then back to the default display.



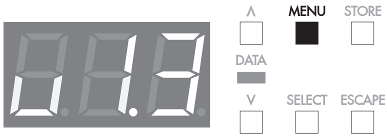
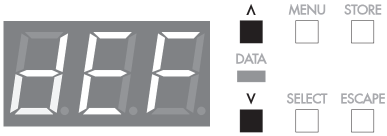
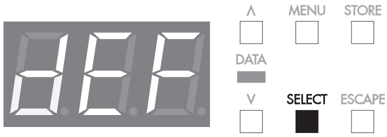
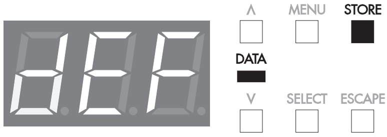
Similarly, to step backward through the various display modes, press the **ESCAPE** button. With the exception of the Show Control Options Mode, the display will revert to the default display dIG if no buttons have been pressed within 15 seconds.

Firmware Version & Default Settings

This display mode shows the version number of the ES1554 module’s firmware — it is important to quote this number if you should have any problems or queries regarding the operation of the module.

This display also allows access to the Defaults Set-up Mode which has two purposes:

- To return all parameters to their standard factory-set values, and / or
- To store the current parameters settings as the power-up defaults.

1. Press the **MENU** button until the firmware version appears on the display.	
2. Press either the ∧ or ∨ buttons to change to the Defaults Set-up Mode.	
3. Press the **SELECT** button to return the current settings of all the ES1554 module’s parameters to their standard defaults. **Note:** *User power-up defaults are not affected.*	
4. Press the **STORE** button to reinstate the factory-set values of all parameters as the power-up defaults. **Note:** *Currently defined values are not affected.* The **DATA** indicator will flash once to show that the settings have been saved.	

Address Mode

Address Number

The ES4000 protocol has the capacity to control the state of up to 96 relays (using D-type commands).

Since the ES1554 has only 16 relays, the Address Number parameter is used to define which block of 16 (within the 96) that the module is to respond to, as shown by the following table:

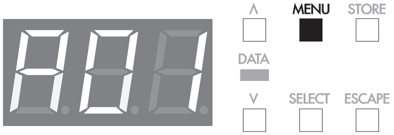
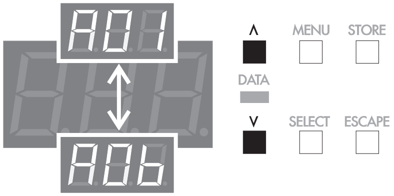
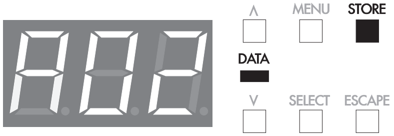
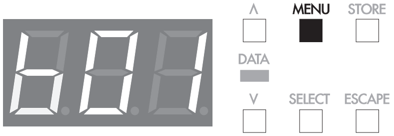
ES1554 Address	**Relay Range**
A01	01 – 16
A02	17 – 32
A03	33 – 48
A04	49 – 64
A05	65 – 80
A06	81 – 96

NOTE *The Address setting does not affect the range of shows/effects controlled by the Show Control parameter.*

Bank Number

The factory default of b01 should not be changed unless otherwise instructed. The alternative setting of b02 is reserved for use with BSC and possible future expansion on other software applications.

Changing the Address Setting

1. Press the **MENU** button until the Address Number appears on the display.	
2. Press the ∧ or ∨ buttons to alter the setting as required.	 A01 A0b ∧ MENU STORE DATA ∨ SELECT ESCAPE
3. To save the new setting as the power-up value, press the **STORE** button. The **DATA** indicator will flash once to show that the settings have been saved. Otherwise, proceed to step 4.	
4. Press the **MENU** button to display the Bank Number. **For all applications this should be set to b01 (unless otherwise instructed)**	

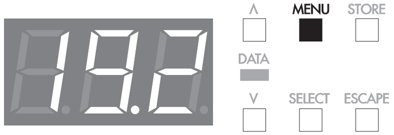
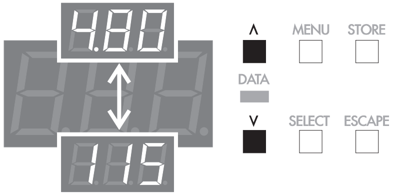
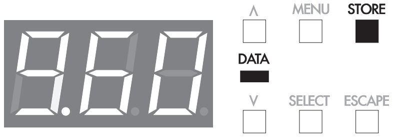
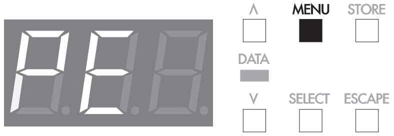
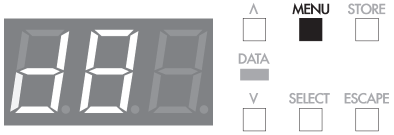
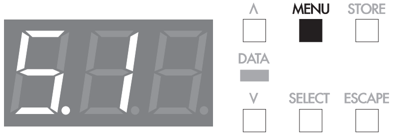
Serial Set-up Mode

This group of four parameters are used to define the characteristics of the ES1554 module's RS-232 serial data link.

In most applications, these settings may be left at their factory-set default values.

• **Baud Rate**	4.80	4800 Baud
	9.60	9600 Baud
	19.2	19200 Baud *(default)*
	38.4	38400 Baud
	57.6	57699 Baud
	115	115200 Baud
• **Parity**	PE	Even *(default)*
	Po	Odd
	Pn	None
• **Data Bits**	d8	8 Bits *(default)*
	d7	7 Bits
	d6	6 Bits
• **Stop Bits**	S.1	1 Bit (default)
	S.1.5	1½ Bits
	S.2	2 Bits

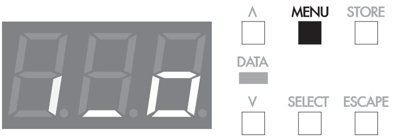
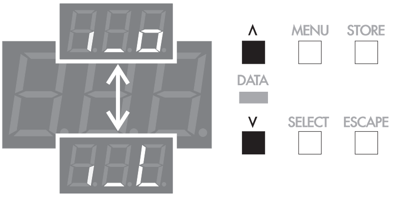
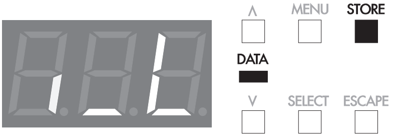
Changing the Serial Control Settings

1. Press the **MENU** button until the Baud Rate setting appears on the display.	
2. Press the ∧ or ∨ buttons to alter the setting as required.	 4.80 115 ∧ MENU STORE DATA ∨ SELECT ESCAPE
3. To save the new setting as the power-up value, press the **STORE** button. The **DATA** indicator will flash once to show that the settings have been saved. Otherwise, proceed to step 4.	
4. Press the **MENU** button to display the Parity setting. If required, alter the setting as described in steps 2 and 3 above.	
5. Press the **MENU** button to display the Data Bits setting. If required, alter the setting as described in steps 2 and 3 above.	
6. Press the **MENU** button to display the Stop Bits setting. If required, alter the setting as described in steps 2 and 3 above.	

Button Lock/Unlock Mode

This mode allows the normal ('unlocked') operation of the 16 relay override buttons to be disabled or 'locked' to prevent accidental operation.

Whilst locked, the buttons will not perform any relay or show start operations.

1. Press the **MENU** button until the Button Lock / Unlock Mode appears on the display.	
2. Press either the ∧ or ∨ button to alter the setting as required.	
3. To save the new setting as the power-up value, press the **STORE** button. The **DATA** indicator will flash once to show that the settings have been saved.	

Input Response Mode

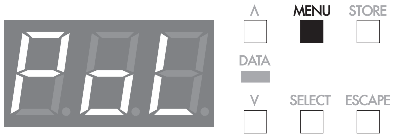
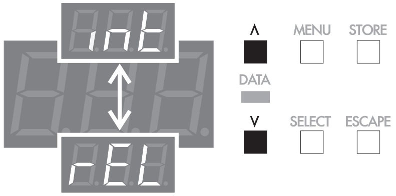
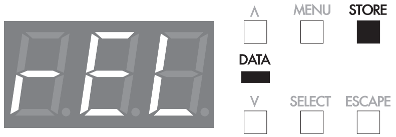
This parameter is used to define how the digital switch inputs are to be used by the module. There are three options available:

- PoL **Poll** – any change to the input status will not have any effect. However, if the module is sent a Query D-type command (via the **DATA LINK** 'data in' terminal), the module will generate a conventional D-type command on its **DATA LINK** 'data out' terminal which reflects the current state of all 16 inputs.

- int **Interrupt** – any change to the input status will cause the module to generate a conventional D-type command on its **DATA LINK** 'data out' terminal which reflects the current state of all 16 inputs.

- rEL **Relay** – the 16 inputs are directly 'mapped' to the 16 relays, such that when an input is made active, the corresponding relay will be turned-on.

Changing the Input Response Setting

1. Press the **MENU** button until the Input Response Mode appears on the display.	
2. Press the ∧ or ∨ buttons to alter the setting as required.	 int rEL ∧ MENU STORE DATA ∨ SELECT ESCAPE
3. To save the new setting as the power-up value, press the **STORE** button. The **DATA** indicator will flash once to show that the settings have been saved.	

Show Control Options

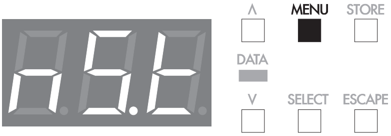
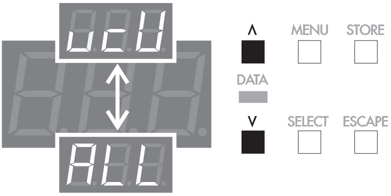
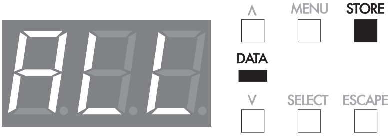
The ES1554 module can be set-up to transmit R-type commands (via the **DATA LINK** ‘data out’ terminal) to provide remote control of the bus master device; this will usually be a show running on an ES1561 Show Control Module or show computer.

This parameter defines how and when the module generates R-type commands, and may be set to one of the following options:

Show Control Setting	Front Panel Buttons	Switch Inputs
nS.t No show start *(default)*	—	—
Anc Ancor Format	*Button 1–8 pressed:* Start Show 1–8 *Button 9–16 pressed:* Stop Show 1–8	*Input 1–8 activated:* Start Show 1–8 *Input 9–16 activated:* Stop Show 1–8
ucU VCU Format	*Button 1–16 pressed:* Start Effect 1–16	*Input 1–16 activated:* Start Effect 1–16
ALL Show Start Routine (ESLINX format)	*Button 1–16 pressed:* Load / run Show 1–16	*Input 1–16 activated:* Load / run Show 1–16

NOTE *This menu/set-up mode will remain selected until changed —it does not revert to the default display after 15 seconds.*

Changing the Show Control Setting

1. Press the **MENU** button until the Show Control Options Mode appears on the display.	
2. Press the ∧ or ∨ buttons to alter the setting as required.	 ucU ALL ∧ MENU STORE DATA ∨ SELECT ESCAPE
3. To save the new setting as the power-up value, press the **STORE** button. The **DATA** indicator will flash once to show that the settings have been saved.	

R-type Formats

The R-type commands generated by each setting are as follows (in each case the value ‘*xx*‘ represents the button or input number 01 to 16):

• **Ancor**	*Start Show*	`^ARSHOWxx^B0=^W^C`
	Stop Show	`^ARSHOWxx^B0<^W^C`
• **VCU**	*Start Effect*	`^AREFFECTxx^B07^W^C`
• **ALL**	*Stop Current Show*	`^AR^B0<^W^C`
	Remove Current Show	`^AR^B09^W^C`
	Remove any Effects	`^AR^B0:^W^C`
	Specify New Show Name	`^ARSHOWxx^B04^W^C`
	Load New Show	`^AR^B08^W^C`
	Run New Show	`^AR^B0=^W^C`

NOTE *The ‘xx’ value is not affected by the ES1554 module’s address setting.*

For more information on the ‘ALL’ option (ESLINX Show Start Routine) see page I-26. For more details about the R-type command in general, refer to page I-24 onwards.

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Section 9:
ES1561 Show Programming

Hardware/Software Requirements

To program a show for the ESLINX system you will need an IBM-compatible computer (PC / AT, laptop or notebook) running an ES4000-compatible application program *e.g.* **Cthrough+*Plus***, **EASY+** or **BSC**. In addition, you will need an ES1530 Flash Card Read / Write Interface Kit or, if your computer already has a PCMCIA socket, you will need the ES1531 Flash Filing System software.

The computer may optionally be fitted with an ES2005 (or ES4325) Communications Card.

It is worth noting that if your computer is fitted with a PCMCIA adapter (configured as a DOS drive, *e.g.* using ES1531) or if you intend using the ES1530 Read / Write Kit, you can run the application program directly from the Flash Memory Card rather than your computer's hard disk.

Large Shows & Expanded Memory

The ES1561 does not currently support Expanded (EMS) Memory and is not, therefore, capable of running very long shows (*i.e.* with a large number of cues) which were created on a computer *with* EMS Memory.

EASY+ allows shows to be chained (*i.e.* one show can load and run another); this feature can be used to overcome problems with long shows by enabling them to be 'split-up' into two or more smaller shows.

Cthrough+*Plus* and **BSC** do not allow show chaining.

Application Status Messages (LCD Display)

Application programs such as **EASY+**, **Cthrough+*Plus*** and **BSC** normally use the computer's video monitor to show status or warning messages, *e.g.* 'File Not Found'. Since the ES1561 does not have a video monitor, any such messages will not be visible to the user.

However, the ES1561 module does have the ability to send text to its own LCD display or to other ES1553 Serial Control Modules. This is achieved by using an ES4000 SU-type command transmitted on **RING 1**. The command can be created using a transmittable comment cue (see page I-29 for details and examples of the SU-type command structure).

For example, a command could be placed at the start of a show which causes the show name to be displayed on the LCD; this will act as a check that the show is actually running. Further commands placed throughout the show file can be used to describe the progress of the show, such as 'House Lights Dimming' or 'Final Sequence Running'.

ES1561 Operating Mode (Transparent or Replay)

The ES1561 module has the ability to operate in one of two modes:

- **Transparent Mode:** this is used for programming and allows an external show computer connected to the **COM 1** and **COM 2** serial ports to directly control **RING 1** and **RING 2** of the ESLINX system (see Fig.9-1a). The module automatically switches to this mode on power-up when a Flash Memory Card is not inserted.
- **Replay Mode:** this is used for show replay and allows the module's internal show computer and Flash Memory Card to take control of **RING 1** and **RING 2** (see Fig.9-1b). This mode is instigated by a utility program on the Memory Card prior to transferring control to the application program.

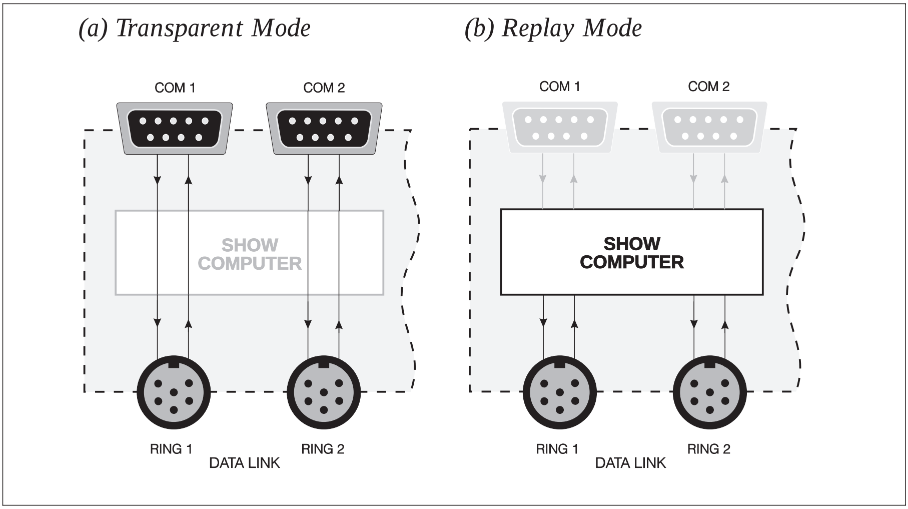


Fig.9-1: The ES1561 Operating Modes.

Connection & Setting-up Procedure

Fig.9-2 shows the basic set-up required in order to program a show for the ESLINX system. The show(s) can either be programmed on-line or off-line (*i.e.* connected or not connected to the actual system).

☞ If your programming computer is fitted with an ES2005 (or ES4325) Communications Card, connect its **RING 1** and **RING 2** connectors (6-pin DIN) to the ES1561 module's **COM 1** and **COM 2** connectors respectively (9-pin standard D-type).

If only one ring is being used in the system, **RING 2** *and* **COM 2** *need not be connected.*

☞ Power-up the computer.

☞ Power-up the ES1561 module without a Flash Memory Card; this will put the module into transparent mode ready for programming.

☞ Run the Application Software (*e.g.* **EASY**, **Cthrough+*Plus*** or **BSC**) on the computer and program your show(s).

☞ Insert a formatted Flash Memory Card into the Flash Drive Unit (ES1530), then save your show(s) to the card and set-up the card for the required show start method (see ‘Programming the Memory Card’ on page 9-6).

☞ Unplug the Memory Card from the Flash Drive Unit and insert it into the ES1561 module; the module will automatically re-boot and will switch to replay mode and will run the show (using the chosen show start method).

☞ If further show editing is required, remove the Memory Card from the module and reboot the module (by pressing the lower three front panel buttons simultaneously, *i.e.* ∨, **SELECT**, **ESCAPE**) to change back to transparent mode. Then reprogram the card as required.

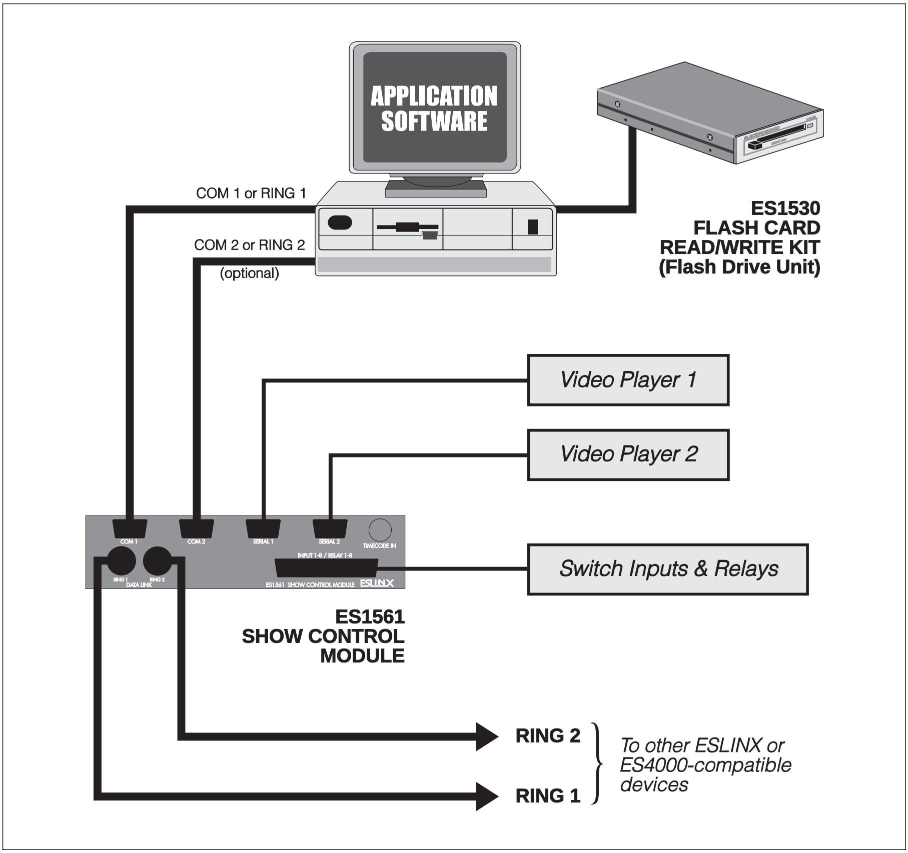


Fig.9-2: The basic ESLINX programming set-up.

Cable Assemblies

Various pre-assembled cables are available for connecting the ES1561 module to the ES4000 Rings and to the programming computer. Refer to page D-11 for further details.

Programming the Memory Card

Hardware/Software Requirements

If you are using a PC / AT, Laptop or Notebook computer which is already fitted with a PCMCIA adapter, this will need to be configured as a DOS-compatible drive using the ES1531 Flash Filing System.

The ES1530 Flash Read / Write Kit is available for computers not fitted with a PCMCIA adapter; (this suitable for PC / AT computers with a spare ISA expansion slot only).

The software disk supplied with ES1530 and ES1531 also includes a special installation program which sets-up the Memory Card for use with the ES1561 Show Control Module.

STEP 1 - Install the ES1530 Flash Card Read/Write Kit or ES1531 Flash Filing System as required *(full instructions are provided with each product).*

STEP 2 - Format the Flash Memory Card and set-up the ES1561 default user files.

☞ Insert the Flash Memory Card into the Flash Drive Unit.

☞ Format the card using the CTFMTFTL utility by typing the following at the DOS prompt:

`CTFMTFTL` *drive:* <**Enter**>

where *drive:* is the Flash Drive letter. For example to format a card in ‘drive D’, type the following:

`CTFMTFTL D:` <**Enter**>

The routine will then display the following message:

```
Warning! You will lose all data on xxxxK Flash Card in drive D:
Format the card as FTL?
```

where the value *xxxx* will indicate the card capacity (*e.g.* 4096kB). Press the **Y** key to proceed or the **N** key to abort.

The card formatting process will then start (this will take approximately 10 seconds per megabyte to complete).

☞ Check that the software installation disk (supplied with ES1530 or ES1531) is in your computer's floppy drive (*e.g.* drive A:).

☞ Change the DOS prompt to the Flash Card drive (*e.g.* drive D:). Then run the SCMSETUP routine from the floppy disk by typing the following:

```
A:\SCMSETUP D:     <Enter>
```

This routine will create the default user files on the Flash Memory Card (USRCNFG.SYS and USRCNTRL.BAT) required by the ES1561 module, together with a directory (UTILS) containing various utility programs.

STEP 3 - Install the Application Program on to the Flash Card.

☞ Follow the installation procedure given in the application's User Guide.

The installation program will create a new directory for the application program. You will not need to install any Help, Example or Utility files.

STEP 4 - Copy your Show File(s) to the application directory.

This may be done in one of two ways:

☞ Copy the file(s) from your hard disk to the Flash Card using the DOS 'COPY' command, ***OR***

☞ Save a copy of the show file(s) to the Flash Card directly from the application program using its 'Save As' function.

NOTE *You may wish to create a separate sub-directory for show files.*

STEP 5 - Edit the Application Command Line in the USRCNTRL.BAT file as required. (see Show Start Options, commencing on page 9-8).

Show Start Options

The application start-up is controlled by the Application Command Line in the USRCNTRL.BAT file located in the root directory of the Memory Card.

The default USRCNTRL.BAT file contains various command lines for use with the three main types of application, *i.e.* **EASY+**, **Cthrough+*Plus*** and **BSC**:

```
rem EASY
rem cd \easy200
rem call easy  myshow.e01 -r -n -b -M -a
rem ensure show file exists, e.g. myshow.e01, otherwise do
     not specify a file

rem CTHROUGH
rem cd \ct331
rem call cthrough  myshow.s01 -r -n -b -M -a1

rem BSC (NOTE! BSC requires timecode card to enable
     external show starts)
rem cd \bsc3
rem call bsc  myshow.s01 -r

rem WARNING!......
rem to autorun from reset the file MYSHOW, change to a
     valid show file name
rem (if MYSHOW is unchanged and is not valid then no show
     is autorun)
```

For full details on the USRCNTRL.BAT file and the other ES1561 files and utility programs, refer to Appendix F.

There are two command lines for each application; the first is a 'change directory' instruction (`cd \`) which directs DOS to the application's working directory and the second is the Application Command Line which sets-up and runs the application.

For example, for **EASY+**, the default lines are:

```
cd \easy200
call easy  myshow.e01 -r -n -b -M
```

The Application Command Line is in three distinct blocks:

- `call easy` which runs the **EASY+** application program
- `myshow.e01` which specifies the name of the default show
- `-r -n -b -M -a` which are start-up option 'flags' (for full details of these refer to page F-6).

IMPORTANT NOTES

These lines are all preceded with a '`rem`*' statement which causes* DOS *to ignore the remainder of the line (i.e. it is not actioned). To make use of a particular line, use an ASCII text editor (e.g.* DOS 'EDIT'*) to delete the '*`rem`*' statement and make any other changes to the line (e.g. the default show name).*

The USRCNTRL.BAT *file 'change directory' lines specify the usual working directory for each application, i.e. the default directory supplied by the application's installation program. If for any reason the default name was not used, you will need to change the line to specify the correct directory.*

Where a default show name is specified on the Application Command Line, this show must actually exist. If the application program cannot load the specified file, further external 'show start' events (e.g. from switch inputs) may be prevented from working.

Using a MIDI Card and the BSCMIDI Program

The ES1561 Module can be used in conjunction with a MIDI Interface Card (*e.g.* the MM-401). This allows the playback of **EASY+** and **BSC** shows to be remotely controlled using the MIDI Show Control (MSC) protocol.

If you are using the ES1561 Module with a MIDI Interface Card, the following criteria must be observed:

- The MIDI Interface Card ‘interrupt’ switches (or jumpers) must be left at the preset factory settings.
- The Card will only work with EASY+ V2.02 (or above) running on the ES1561 Module.
- The Card will not work whilst the ES1561 Module is in Transparent Mode.
- When connected to the ES1561 Module, the MIDI Interface Card will only respond to EASY+ (and the show) running from the Flash Memory Card. If MIDI control is required during programming, an additional MIDI Card will need to be connected to the programming computer.

Automatic Show Start

The default configuration of the Application Command Line listed in the USRCNTRL.BAT file provides the usual method of automatic show start when the module is powered-up.

For example, to auto-run the **Cthrough+*Plus*** show call MAINSHOW.S01:

☞ Delete the ‘`rem`’ statement from the two relevant command lines in the USRCNTRL.BAT file, then change the default MYSHOW.S01 to MAINSHOW.S01 on the Application Command Line:

```
rem CTHROUGH
rem cd \ct331
rem call cthrough  myshow.s01  -r -n -b -M
```

The command lines will then look like this:

```
rem CTHROUGH
cd \ct331
call cthrough  mainshow.s01 -r -n -b -M
```

IMPORTANT NOTE
The ‘`-r`’ flag ‘toggles’ the on/off state of the application program’s Auto-run function. **Once Auto-run is turned-on, the ‘`-r`’ flag must be deleted from the command line.**

PROGRAMMING HINT
Most application programs also allow a default show and Auto-run to be set-up within the program itself (refer to the application User Guide for further details).

Manual Show Start (using Show Start Routine)

This method uses the special show start routine (inherent to both the ES1561 and ES1553 modules) which allows a switch input to load and run a show. It is suitable for starting a single show or one of up to 64 shows.

☞ Delete the ‘`rem`’ statement from the two relevant command lines in the USRCNTRL.BAT file, then delete the default show name (MYSHOW.S01) and the auto-run flag (`-r`) from the Application Command Line (*e.g.* for **EASY+**):

```
rem EASY
rem cd \easy200
rem call easy  myshow.s01 -r -n -b -M
```

The command lines will then look like this:

```
rem EASY
cd \easy200
call easy -n -b -M
```

☞ Ensure that the required show(s) is copied to the Memory Card from the programming computer using the naming convention SHOW*nn*, where *nn* = 01 to 64.

☞ Set-up a switch input with a show start routine; this can be in either the ES1561 module’s own serial processor or a separate ES1553 module. Refer to page 10-14 or 5-14 for details.

☞ Activate the switch input to start the show.

Advantage:	Simple set-up procedure.
Disadvantages:	The show is not pre-loaded which can causes a slight delay in show start (particularly with larger shows). The show names must conform to the SHOW*nn* format.

Manual Show Start (using Internal Sequences)

This method exploits the ability of some application programs (*e.g.* **Cthrough+*Plus***) to load more than one show by treating them as 'effects'. It is also suitable for starting a single show where a minimal start delay is essential.

A dummy (non-functioning) show is created which simply 'calls' the required shows. For example, loading the following show called 'ALLSHOWS.S01':

```
00001    HALT     CALL MAINSHOW
00002    HALT     CALL DAYTIME
00003    HALT     CALL EVENING
00004    HALT     CALL SPECIAL
```

will also load the shows called MAINSHOW, DAYTIME, EVENING and SPECIAL.

To run one of these shows a 'Run Effect' R-type command is sent to the show computer. For example, to run the SPECIAL show, the following R-type would be required:

```
^A R SPECIAL ^B 07 ^W ^C
```

The most convenient way of producing this R-type command is to program it as an internal sequence; one sequence is required for each show. The sequence can be in either in the ES1561 module's own serial processor or a separate ES1553 module. For an overview of Internal Sequences, refer to page 5-9 or 10-9.

The sequence can then be triggered by using a switch input.

HELPFUL HINT

If you are using an ES1561 (or ES1553) with firmware version V1.2 or later, the Start Effect option within the Input Set-up Menu provides an easier method of generating a Run Effect R-type – see page 11-9 (or 6-9).

Using **Cthrough+*Plus*** and ALLSHOWS.S01 as an example:

- ☞ Delete the '`rem`' statement from the two relevant command lines in the USRCNTRL.BAT file, then change the default MYSHOW.S01 to the dummy show ALLSHOWS.S01, and delete the auto-run flag (`-r`) on the Application Command Line:

```
rem CTHROUGH
rem cd \ct331
rem call cthrough  myshow.s01 -r -n -b -M
```

The command lines will then look like this:

```
rem CTHROUGH
cd \ct331
call cthrough  allshows.s01 -n -b -M
```

If only one show is required, the name of that show can be specified in place of the dummy show.

- ☞ Program an internal sequence (one for each show) with a Run Effect R-type command using the Four Disk Controller software utility (see page H-2). See also 'HELPFUL HINT' on the previous page.

- ☞ Set-up the corresponding switch input to trigger the internal sequence. Refer to page 10-13 or 5-13 for details.

- ☞ Activate the switch input to start the show.

Advantages:	Less delay on show start since show is already loaded. Allows any format of show name to be used.
Disadvantage:	Programming and set-up is more complex.

Power-up Procedure

Inserting/Removing a Memory Card

The Flash Memory card can be inserted or removed from the unit with or without the module being powered. However, please take note of the points listed on the next page.

☞ **To insert** – hold the Memory Card with the printed logo uppermost and its edge connector facing the slot in the front panel, and then push it firmly into the slot.

☞ **To remove** – press the **EJECT** button (on the left of the card slot) and withdraw the card.

Boot-up/Self-Test Routine

When the power is turned-on, the module will go through an initialisation routine (or ‘boot-up’) during which the LCD screen will show the module ‘initialising’.

The module will also perform a self-test and this will be indicated by the **RING 1** & **2** and **COM 1** & **2** indicators flashing alternately from green to orange.

When the self-test is successfully completed, the module will transfer control to the application software. If a start-up show is specified within the application (or on its start-up command line) the show will commence automatically (see page 9-11).

Resetting the ES1561 Show Computer

In the event of needing to restart / reboot the show computer (and its application program / default show) press the three lower menu function buttons simultaneously (*i.e.* ∨ + **SELECT** + **ESCAPE**).

Points to Remember

- If the module is powered-up without a Memory Card, the LCD screen will show the message — `<<No Flash Card`; this message can be cleared from the display after five seconds by pressing any of the menu function buttons on the front panel. In addition to the message, the indicators for **RING 2**, **COM 1** and **COM 2** will all show orange. If a card is then inserted, the module will reset and boot-up as described on the previous page.
- Do not insert or remove the Memory Card when the **BUSY** indicator shows red (*i.e.* when the Module is accessing the card).
- The ES1561 module may be powered-up or -down with or without the Memory Card being inserted.
- Removing the Memory Card whilst a show is running will not disrupt the show. The show will continue until a request is generated for a different show – at which point the application software will halt since it cannot load the new show from the card. Re-inserting the card will cause reset and re-boot.
- To return the module to transparent mode (*e.g.* for reprogramming) remove the Memory Card and press the three lower front panel buttons to reboot the module.
- If automatic show-start is required, ensure that the Application Command Line of the USRCNTRL.BAT file specifies the correct show name and that Auto-run is enabled in the application program (using `-r` flag).
- If manual show-start is required (using switch inputs), ensure that the show file(s) is named using the correct convention, *i.e.* SHOW01, SHOW02, SHOW 03, *etc.* Also ensure that the switch input is enabled.
- The application show files must be present in the directory or sub-directory defined within the application program (this will usually be defined when the application software is installed on the card).
- If you are using **EASY+** or **BSC** with a MIDI Interface Card, remember to set-up the card for '**int 5**' and to run the BSCMIDI program by adding the '`BSCMIDI 5`' command to the USRCNTRL.BAT file. In addition, when using **EASY+**, add the '`-i2`' flag to the Application Command Line.

Section 10:
ES1561 Configurations

The diagram below illustrates the main functional blocks within the ES1561 module plus their related control inputs and outputs. Apart from the show computer (shown at top left), these blocks comprise the serial processor:

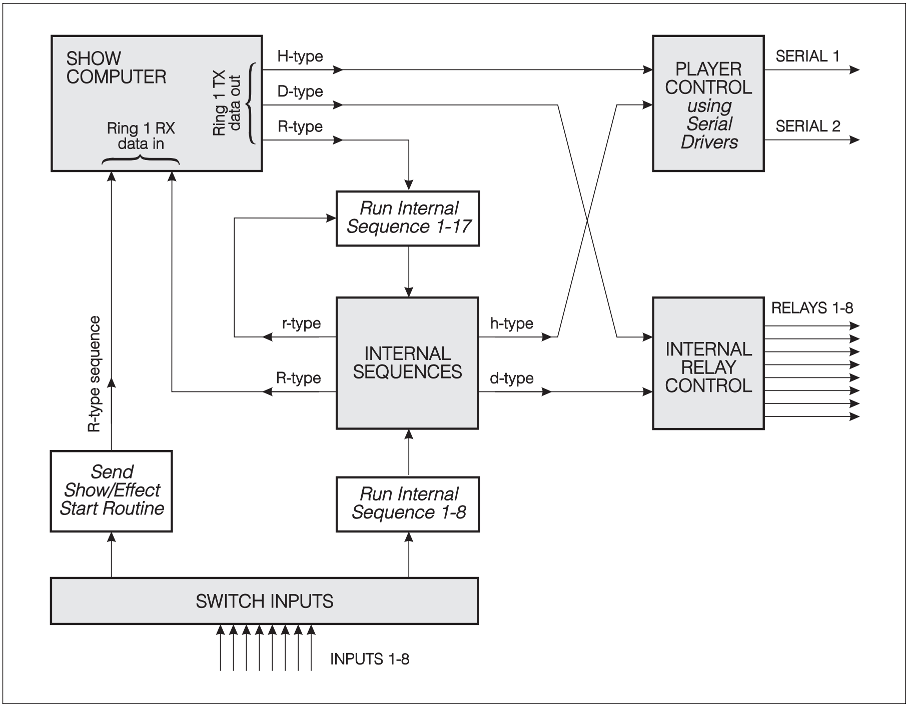


Fig.10-1: Block diagram of ES1561 functions & control.

This section introduces the various configurations that are possible by explaining the operation and available options within each block.
In practice, a combination of two or more of operating configurations may be used at the same time.

Player Control

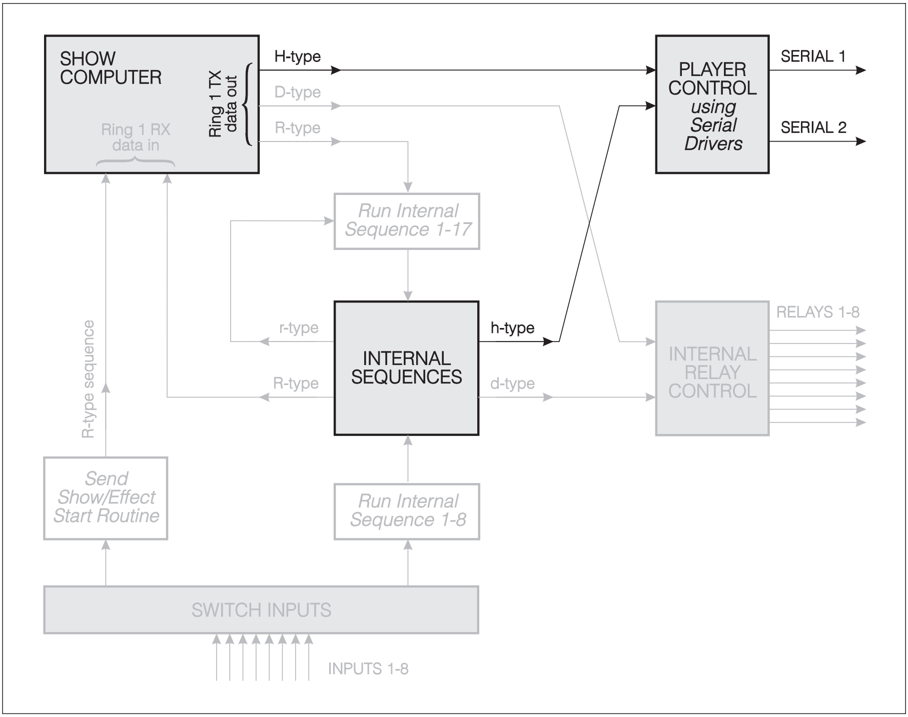


Fig.10-2: Player control options

Two external devices (*e.g.* video tape / disc players) can be connected via the **SERIAL 1** and **SERIAL 2** connectors.

These devices can be controlled from either or both:

- the module's **show computer** (*i.e.* a show or application program (*using the H-type command format*), or
- an **internal sequence** (*using the h-type command format*).

The serial processor uses the appropriate internal serial drivers to translate these commands into suitable instruction codes for controlling the players.

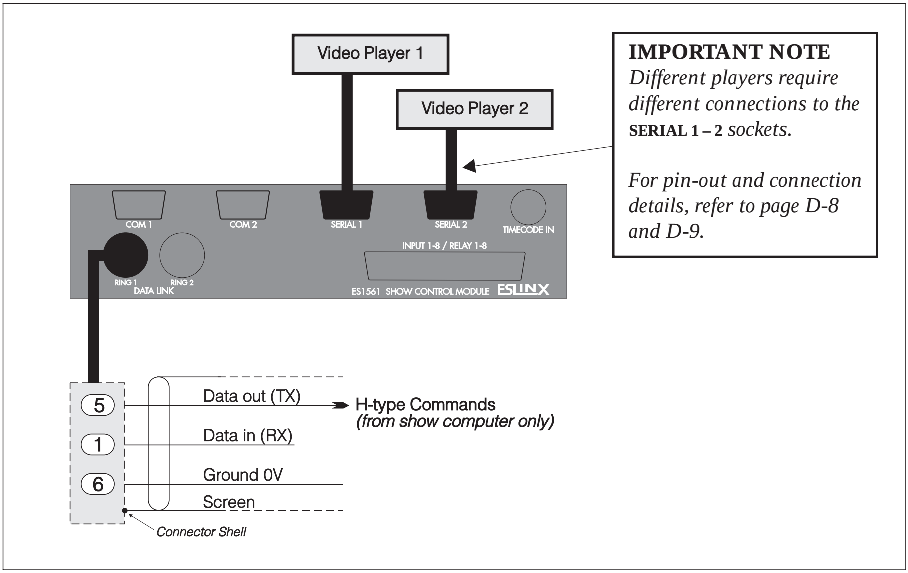
Controlling Players from a Show

The tape / disc 'player control' functions provided by Electrosonic's **Cthrough+*Plus***, **EASY+** and **BSC** application programs automatically generate the required H-type command format. These programs allow full control of player operation (*e.g.* play, rewind, search, *etc.*) and also the setting of the player type (*i.e.* the serial driver to be used).

Alternatively, customised H-type commands may be created in the above applications by utilising transmittable comment or remark cues. Further details on the H-type command structure are given on page I-16.

The application program (and show) runs on the show computer and transmits commands to the serial processor (and to any other external devices) via the TX Line of the **RING 1** data highway (as shown in Fig.10-3).

Since the H-type command format can support up to 24 'players' (depending on the limits of the application program), it is necessary to define which two of these are assigned to the outputs **SERIAL 1** and **2**. This is governed by the 'Players' setting in the Parameter Menu (see page 11-16).



IMPORTANT NOTE
Different players require different connections to the **SERIAL 1 – 2** *sockets.*

For pin-out and connection details, refer to page D-8 and D-9.

Fig.10-3: Connections for Player Control.

Controlling Players from an Internal Sequence

Internal sequences can be made to control the players by using cues in the ‘lower’ h-type command format. These cues are programmed using the Four Disc Controller utility – for further details, refer to Appendix H.

For further details on using Internal Sequences, refer to page 10-9.

Serial Drivers

The serial drivers are chosen to match the type of tape / disc players to be controlled – refer to Appendix E for a list of the drivers included with the ES1561 module. The required drivers are either selected manually via the control panel (using the Player Set-up menu – see page 11-5) or via the application program.

Each serial output can be configured to use RS-232, RS-422, RS-485 or Infra-Red communication standards. Selecting a serial driver via the Player Set-up Menu will automatically set the correct default standard and baud rate, *etc*., for that driver. These parameters may then be altered to suit individual circumstances.

The serial driver and its associated parameters can also be set or changed by using H-type (or h-type) transmittable comments. Further details on the H-type command format are given on page I-16.

IMPORTANT NOTE: *Different communication standards require different* **SERIAL** *socket connections; see page D-8 and D-9.for details.*

Creating New Serial Drivers

New serial drivers will be released periodically by Electrosonic as new players become available or enhancements made to existing products.

You may also wish to generate customised serial drivers for special applications or non-standard devices. New drivers can be created using a conventional text editor (*e.g.*DOS ‘EDIT’) and then down-loaded into the module (via the **DATA LINK** ring) by using the DRVPROG utility. Refer to page E-3 for further details.

Relay Control

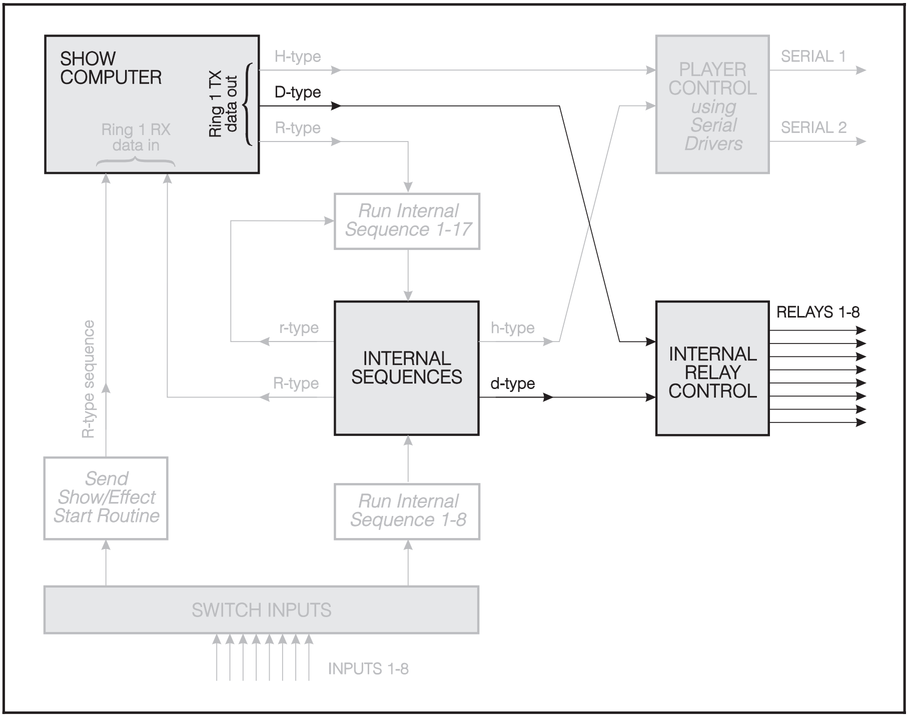


Fig.10-4: Relay control options.

The eight internal relays can be controlled using either or both:

- the module’s **show computer** (*i.e.* a show or application program (*using the D-type command format*), or
- an **internal sequence** (*using the d-type command format*).

Controlling Relays from a Show

The 'relay control' functions provided by Electrosonic's **Cthrough+*Plus***, **EASY+** and **BSC** application programs automatically generate the required D-type commands.

Alternatively, customised D-type commands may be created in the above applications by utilising transmittable comment or remark cues. Further details on the D-type command structure are given on page I-4.

The application program (and show) runs on the show computer and transmits commands to the serial processor (and to any other external devices) via the TX Line of **RING 1** data highway (see Fig.10-5 on page 10-8).

Since the D-type command can support up to 96 relays (depending on the limits of the application program), it is necessary to define which 'block of eight' are assigned to the outputs **RELAYS 1–8**. This is governed by the 'Relays' setting in the Parameter Menu (see page 11-16).

Extended D-type Commands

The standard D-type command controls relays in groups of four and all relays within that group will be forced to an On / Off state. In the various application programs, all relays are forced to an Off condition when a new show is loaded. The application then maintains an on-going status for each relay throughout the show as each (D-type) Relay cue is encountered.

When using transmittable comment cues to control relay operation, the current status of relays may not be known. You may also require the state of one or more relays in a show to be variable according to an unpredictable event (*e.g.* user interaction).

The ES1561 can use an extended form of the D-type command which allows selected relays to be 'enabled'. This means that a specific relay(s) can be made to operate independently of the others in its group of four. Currently this extended D-type command can only be created using the transmittable comment / remark cue facility in **Cthrough+*Plus***, **EASY+** and **BSC**. Further details on the extended D-type command format are given on page I-6.

Controlling Relays from an Internal Sequence

Internal sequences can be made to control the players by using cues in the 'lower' d-type command format (either standard or extended). These cues are programmed using the Four Disc Controller software utility – for further details, refer to Appendix H.

For further details on using Internal Sequences, refer to page 10-9.

Relay Operation & Connections

The state of each relay is defined as follows:

- **Off** contact Com makes with NC,
- **On** contact Com makes with NO.

All relays are set to the 'off' state at power-up or reset.

Electrical connection to the relay contacts is achieved via the **RELAYS 1-8** connector, as shown in Fig.10-5 on page 10-8.

Each relay is capable of switching up to 50V d.c. or 24V a.c. @ 200mA. For full technical details, refer to page D-6.

WARNING
These relay contacts are ***not*** *safety isolated and are* ***not suitable for mains voltage operation.***

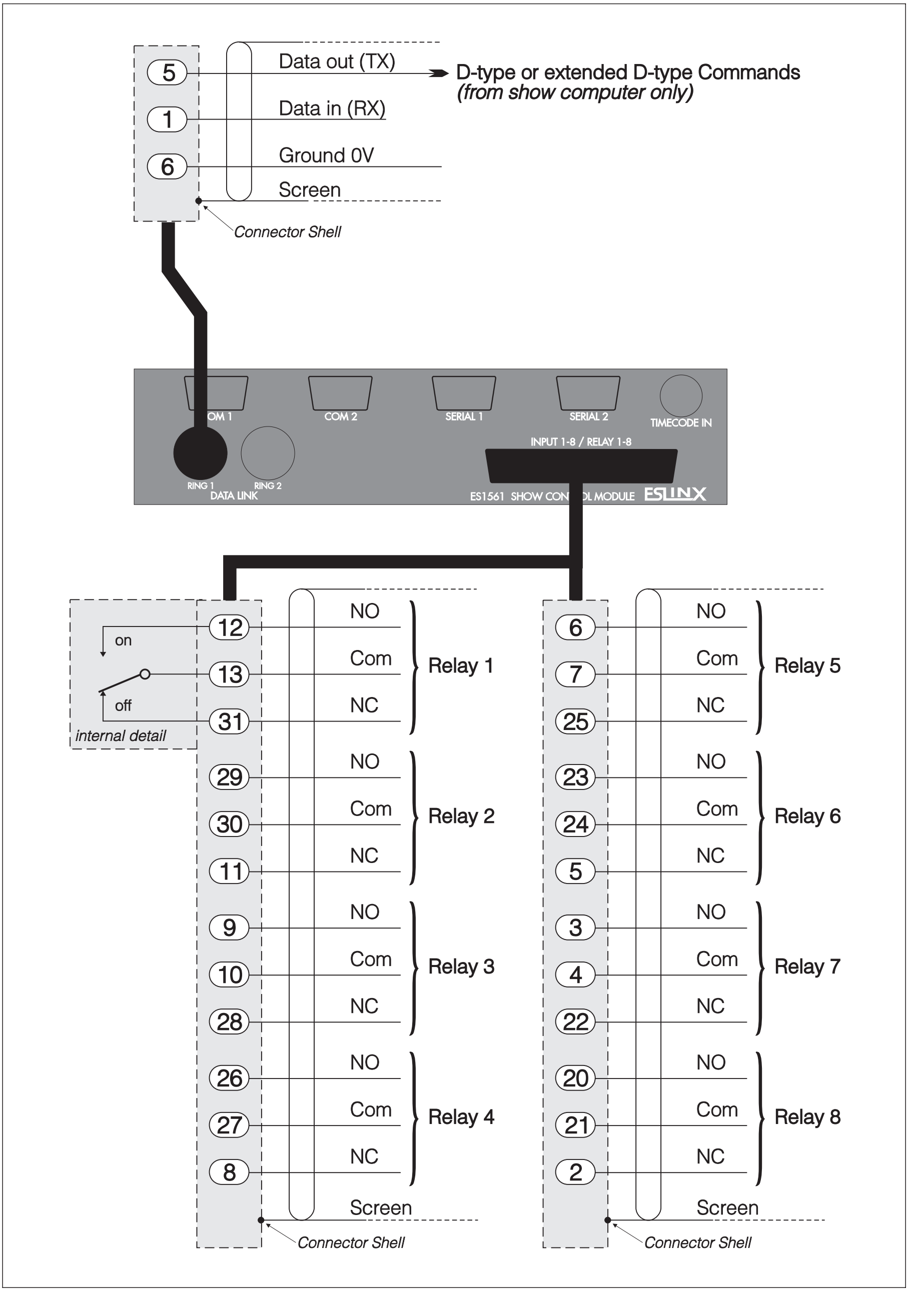


Fig.10-5: Connections for the internal relays.

Internal Sequences

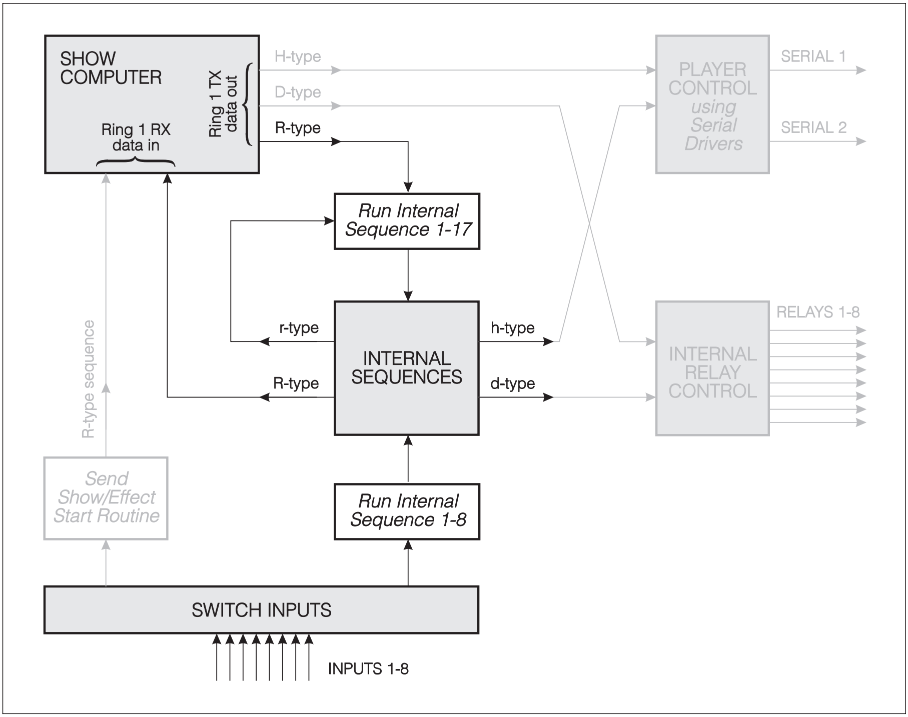


Fig.10-6: Internal sequence control options.

The ES1561 module's serial processor has 17 internal sequences to which one or more 'cues' can be assigned. The module has a storage capacity for up to a total of 112 cues *shared* between the 17 sequences.

Typically, sequences might be used to perform routine 'house-keeping' operations, *e.g.* ensuring players are at the correct starting positions, or to run 'attractor' shows.

Programming Internal Sequences

Internal sequence cues are created with the Four Disk Controller (FDC) software utility and then programmed into the ES1561 module's serial processor via the **COM 1** serial port. The FDC software is supplied on the ESLINX Utilities Disk with full instructions; refer to Appendix H for further information.

Cue Format

Each internal sequence cue is stored as an ES4000 command of up to 24 characters (including all control characters, *i.e.* ^A, ^B, ^W and ^C).

In principle, any recognised ES4000 command format (of suitable length) may be used. However, cues will most commonly be used for the following functions:

- Control or set-up of the external players (*h-type commands*),
- Control of the internal relays (*d-type commands*),
- Start or stop another internal sequence (*r-type commands*),
- Load, start or stop an external show (*R-type commands*).

In addition, cues can be created which:

- Enable, disable or set-up the module's switch inputs,
- Write to the module's LCD display.

By default, internal sequence cues are only used by the module in which they are stored. On the ES1561 Module, this means that they are used to control the serial processor unit. However, cues can also be programmed to be output to the RX line of the **DATA LINK RING 1** ring (*i.e.* back to the 'bus master'). Thus, for example, an R-type (remote control) cue can be sent to the show computer, to start or stop a show.

Starting a Sequence

Internal sequences can be started in three ways:

- Using R-type commands from the show computer, or
- Using switch actions via the **INPUT 1-8** connector – *this method can only be used to start sequences 1 to 8,*
- Using the front panel Manual Start facility (see page 11-20) – *this method can only be used to start sequences 1 to 8.*

In addition, sequences can include cues which start (or stop) other sequences.

IMPORTANT NOTE
If required, two or more sequences are capable of running at the same time. However, perfect synchronisation between different sequences cannot be guaranteed in all circumstances.

Sequence 17 Auto-start

Sequence 17 can be started automatically when the module is powered-up or reset. This facility is controlled by the Start Delay setting in the Parameter Set-up menu (see page 11-16), which also specifies a delay before starting the sequence:

OFF	*(do not run on power-up/reset)*
5s	*(run after 5 seconds)*
15s	*(run after 15 seconds)*
30s	*(run after 30 seconds)*

IMPORTANT NOTE
The Start Delay setting can be temporarily overridden by pressing and holding the menu **SELECT** *button whilst the module is powered-up, until the message –* `Seq 17 no start` *– appears on the LCD screen.*

Starting a Sequence from a Show

Internal sequences can be started using a variation of the R-type command structure. Currently this ‘sequence start’ format of the R-type command can only be created using the transmittable comment/remark cue facility in **Cthrough+*Plus***, **EASY+** and **BSC**.

The following example will run sequence 5 on the module at Address 1:

```
^Aseq05^B0=^W^C
```

Further details on the special format R-type command are given on page I-27.

Starting a Sequence from a Switch Input

There are eight opto-isolated switch inputs provided on the **INPUT 1-8** connector. These are directly mapped to the first eight internal sequences, such that input 1 is used to run sequence 1, input 2 is used to run sequence 2, and so on.

To enable sequence start, the Def Seq parameter for the required input(s) must be correctly set in the Input Set-up menu (see page 11-9). This will have one of two settings:

• `None`	which means that sequence start is disabled, or
• a number (`01` to `08`)	which corresponds to the input / sequence number and means that the sequence will be started when the input is triggered.

For details on switch input connections and trigger conditions, refer to page 10-17

PROGRAMMING HINTS

Although sequences 9 to 17 are not directly accessible via switch actions, these can, if required, be chained from sequences 1 to 8. For example, the last cue in sequence 1 could start sequence 9.

By keeping a switch input active (i.e. in its 'triggered' state) the associated sequence will repeat continuously until the input is released. A cue can be programmed (using 4-DISC*) which disables/enables sequence start from within the same (or another) sequence to avoid or exploit this feature as required.*

Remote Show Control

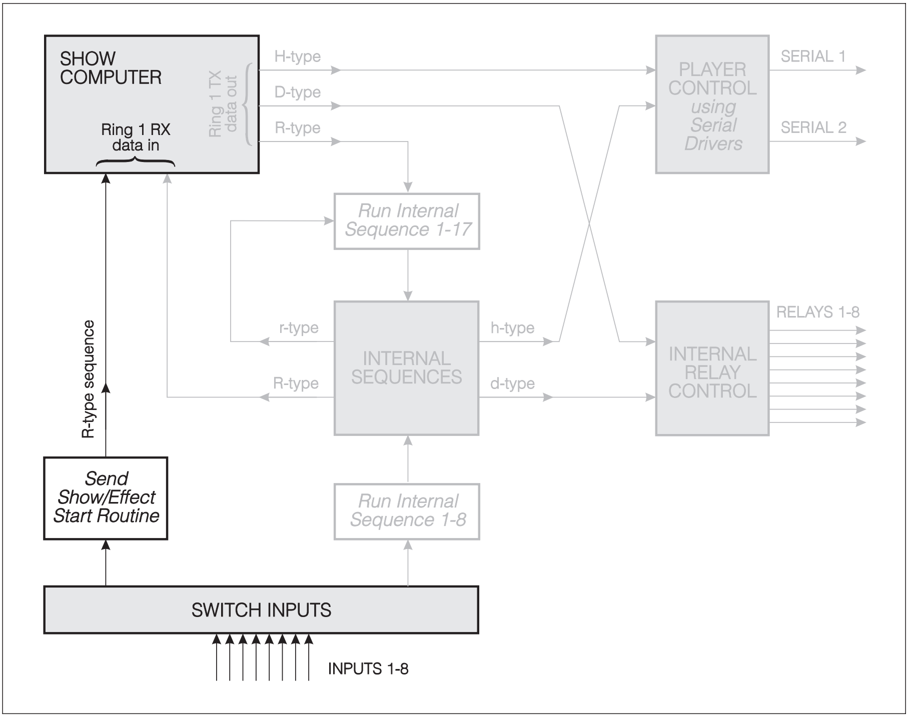


Fig.10-7: Remote show start using switch inputs.

The serial processor within the ES1561 module has two remote control routines — 'Show Start' and 'Effect Start' — which can be triggered via the switch inputs . (These functions are also provided by the ES1553 Serial Module – see page 5-14., and the ES1554 Digital Module – see page 7-8).

These routines transmit R-type commands (via the RX Line of **RING 1** data highway) which will run a show (or an effect) on the show computer.

NOTE *Since these commands appear on the RX Line of the Ring, they can normally only be received by the 'bus master' (i.e. the internal show computer) and* ***not*** *by other devices on the Ring.*

Show/Effect Start Routine

In a **Show Start Routine** six different R-type commands are transmitted, which perform the following tasks:

- stop, and remove the current show plus its effects (if any),
- specify the new show named as ‘SHOW*nn*’ (where *nn* is a two digit number 01 to 64),
- load and run the new show.

In an **Effect Start Routine**, a single R-type command is transmitted which performs the following task:

- specify and run the effect named ‘EFFECT*nn*’ (where *nn* is a two digit number 01 to 64).

PROGRAMMING HINT

Because the Show Start Routine has to delete an existing show and load the new show before actually running it, there will be a slight delay between the switch input event and the first show cue. In most installations this delay should not pose any problem.

If, however, a faster show start is required, it is possible with certain application programs to pre-load a number of shows as ‘effects’. It is then possible to use the Effect Start Routine which will start the show almost instantaneously. For further details on how to use this method of operation, refer to pages 9-13 to 9-14).

To enable a Show or Effect Start Routine, the Show parameter for the required input(s) must be correctly set in the Input Set-up menu (see page 11-9). This parameter can have one of three values:

- `None` show / effect start is disabled,
- `SHOW`*nn* show start is enabled (the displayed name, *e.g.* SHOW01 is the name of the show that will be loaded and run when the input is triggered,
- `EFFECT`*nn* effect start is enabled (the displayed name, *e.g.* EFFECT01 is the name of the effect that will be run when the input is triggered; (the effect must be pre-loaded).

In either case, the show / effect number (*nn*) is relative to the input number and the setting of the Show / Efct parameter in the Parameter set-up menu pages 11-16 and 11-9).

The routine is initiated by triggering one of the inputs on the **INPUT 1-8** connector. For details on switch input connections and trigger conditions, refer to page 10-17.

Switch Inputs

The eight opto-isolated switch inputs can be used for three purposes:

- Starting an Internal Sequence, or
- Triggering a Show Start Routine (to load & run a different show), or
- Triggering an Effect Start Routine (to run an effect).

NOTE *If required, a show (or effect) and an internal sequence can both be started from the* ***same*** *switch input.*

The inputs are bi-directional and can, therefore, be used with common ground, common positive or low-voltage a.c. systems.

Fig.10-8 (on the next page) shows a typical method of connection using the internal +12 Volt supply. If an external power supply is to be used, the voltage applied to the input lines must be within the range ±5 to ±24V with respect to ‘common’.

Switch Input Polarity

Normally each input is triggered by a ‘negative’ voltage change. In Fig.10-8 this will occur when a switch is closed and the input voltage changes from 12V(nominal) to 0V.

If required, the input can be configured to respond to a ‘positive’ voltage change, *i.e.* the act of opening a switch will trigger the input.

This is defined using the Polarity parameter in the Input Set-up menu (see page 11-9) and should be set as follows:

- `Normal` input is triggered when switch closes (negative edge), or
- `Reverse` input is triggered when switch opens (positive edge).

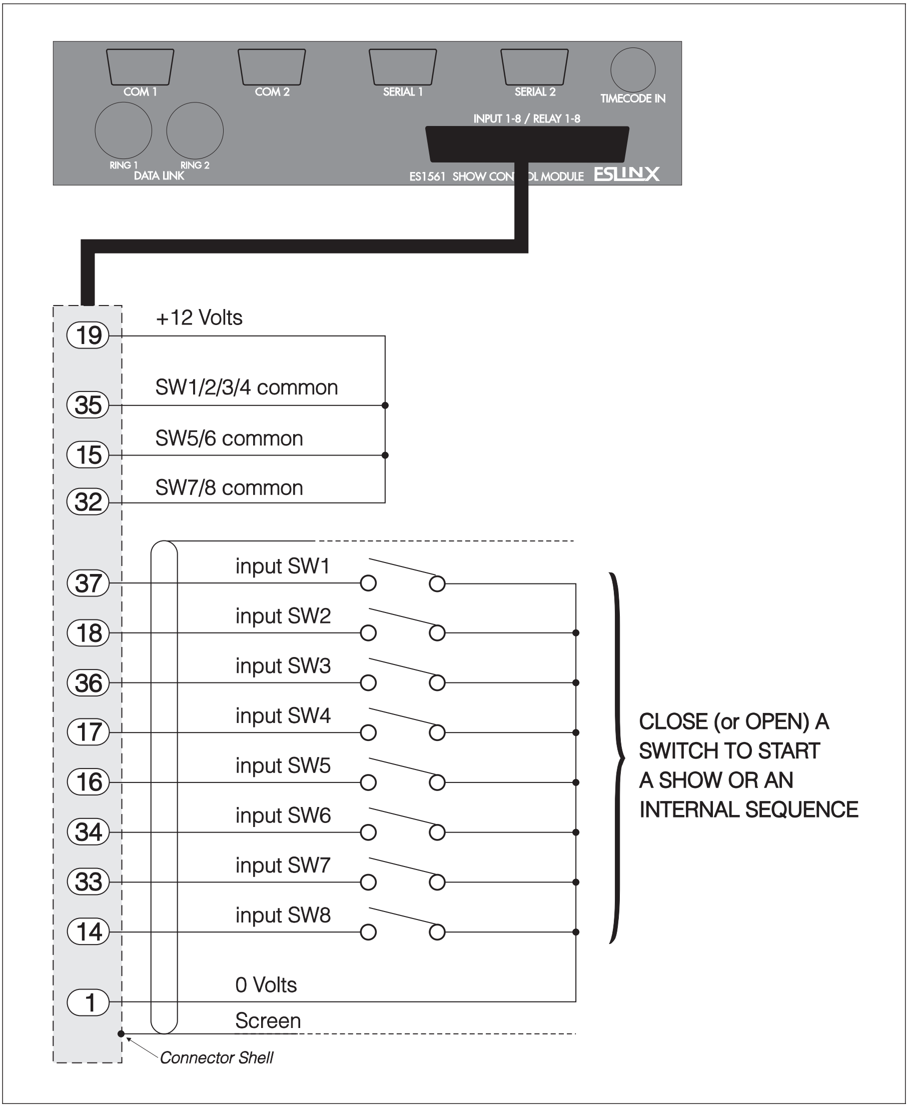
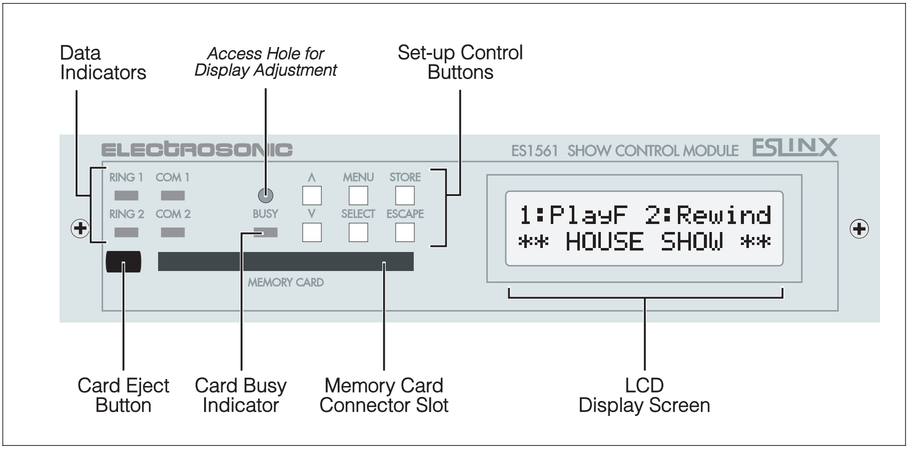


Fig.10-8: Typical method of using switch inputs.

Section 11:
ES1561 Set-up Procedures

Control Panel Overview



The front control panel includes the following controls which are used for viewing and changing the internal set-up parameters for the ES1561 module's serial processor unit:

• **32-character LCD Display**	for displaying the various set-up menus and parameters.
• **6 Set-up Control Buttons**	for viewing and changing the various parameters.

> ***IMPORTANT NOTE***
> *The set-up parameters of the show computer are not accessible via these controls. Refer to Section 9 and Appendix F for details on modifying show parameters.*

User Interface

Data about the internal status and set-up parameters of the ES1561's serial processor unit are accessed and changed using the six push-buttons on the front panel. The current settings and the alternative options are displayed on the LCD screen via nine basic screens or 'menus':

• Player Status	*(see page 11-4)*
• Player Set-up	*(see page 11-5)*
• Player Control	*(see page 11-7)*
• Input Set-up	*(see page 11-9)*
• Output Set-up	*(see page 11-12)*
• Sequence View	*(see page 11-14)*
• Parameter Set-up	*(see page 11-16)*
• Diagnostic View	*(see page 11-18)*
• Manual Starts	*(see page 11-20)*

When the Module has finished its initialisation sequence (after power-up), the display will default to showing the Player Status screen. To select a different screen / menu, press the **MENU** button or the ∧ and ∨ buttons (as shown in the table opposite).

RING 1 Indicator

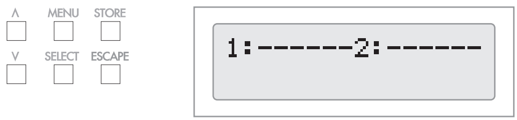
This indicator has two functions, each shown by a different colour:

- *Green* when a serial command is being transmitted (from the show computer) via the **RING 1** data highway.
- *Red* (flashing) when new settings are being saved in the internal memory following a **STORE** operation.

If both of the above actions occur simultaneously (or during initialisation) the indicator will appear orange in colour. At all other times the indicator will not be lit.

Selecting the Required Screen Mode (or Menu)

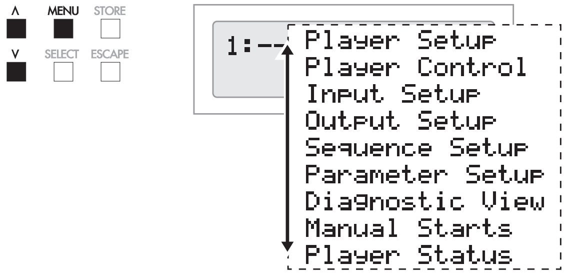
The ES1561 will default to the Player Status screen after power-up.



To step down through the available menu list, press the **MENU** or the ∨ button.

To step up through the list, press the ∧ button.

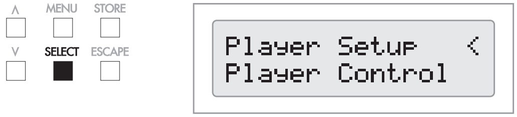
Note: *Pressing and holding a button will step through the options continuously until the button is released.*

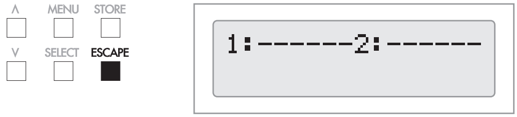


To select a particular screen mode or sub-menu, position the required option name on the top line of the display and press the **SELECT** button.

OR

To return to the Player Status screen, press the the **ESCAPE** button.



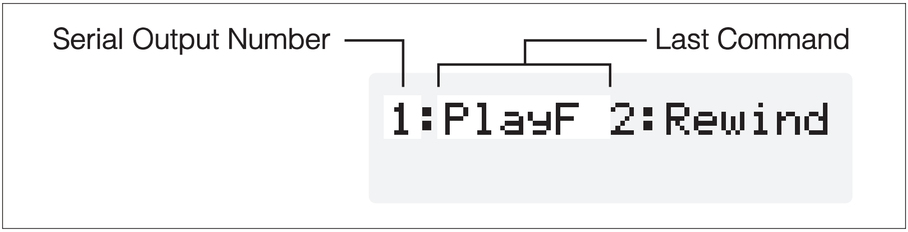


Basic Principle of Menu Operation

Each of the ES1561 menu screens use a similar method of operation:

- The **MENU**, ∧ or ∨ buttons are used to position the required menu option on the top line of the display (as indicated by the < character).
- The **SELECT** button is used to choose the displayed option and to go to the sub-menu(s) or set-up level.
- The **STORE** button is used to save a changed setting.
- The **ESCAPE** button is used to move back by one sub-menu level.

Player Status



This is the ES1561 Module’s default screen mode.

It displays the last command transmitted to the two serial control outputs (*i.e.* **SERIAL 1** and **SERIAL 2**). Certain types of serial driver also allow return messages from the player to be displayed (*e.g.* status information).

If a ‘`Fault`’ message is displayed, it indicates that a command has been transmitted but an expected response has not occurred, *e.g.* a ‘Search to Frame’ command has failed. If this appears, you should check that the player is properly connected and powered, and that a disc or tape is loaded. Then perform a ‘Player / Fault Reset’ operation using the Player Control mode (see page 11-7).

At power-up, each player will be sent a ‘`Clear`’ command to remove any false information in its input buffer.

To change the Player type / driver, use Player Set-up mode.

Player Set-up

The Player Set-up menu is used to configure each serial output for the type of player being used. The following parameters exist for each player:

- **Driver Type:** this defines the protocol of the serial output and must be chosen to match the player being used (see Important Note below).
- **Baud Rate:** the communication speed of the serial link which may be one of the following values:
  - 1200
  - 2400
  - 4800
  - 9600
  - 19200
  - 38400
  - 57600
  - 76800
  - 115200
  - Special *(used by Infra-Red drivers)*
- **Data Bits:** selectable as 8, 7, 6 or 5 bits.
- **Parity:** selectable as None, Odd or Even.
- **Communication Type:** the communication standard of the serial link which may be one of the following:
  - RS-232
  - RS-422
  - RS-485
  - IR *(Infra Red)*
- **Disc Type:** the data format of the laser disc being used which may be one of the following (not applicable to tape players):

CAV	*(Constant Angular Velocity)*
CLV	*(Constant Linear Velocity)*

- **Video Standard:** the video signal type being output by the player which may be one of the following:

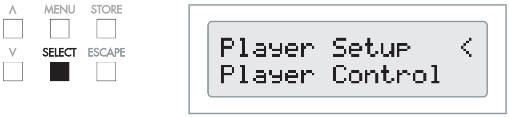
PAL	*(50Hz – 25 frames per second)*
NTSC	*(60Hz – 30 frames per second)*

IMPORTANT NOTE

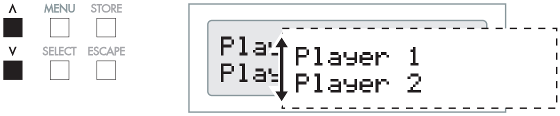
*Selecting a different Driver Type via the Player Set-up Menu will reset the other parameters (baud rate, comms type, etc.) to the default values defined by that driver; these can then be altered if required. For a full list of driver types (and default values) refer to Appendix E. Selecting a Driver with an H-type command will **not** reset the other parameters.*

Changing the Player Set-up

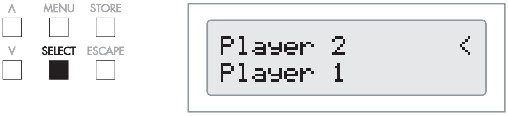
1. Use the **MENU**, ∧ or ∨ buttons to position the Player Set-up option on the top line of the display, then press the **SELECT** button



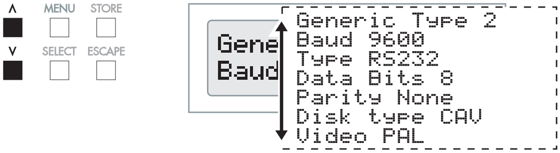
2. From the list of player numbers,use the ∧ or ∨ buttons to position the required Player on the top line of the display, then press the **SELECT** button.



For example, ‘Player 2’:

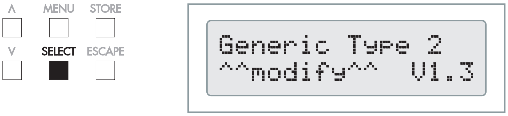


3. From the list of set-up parameters, use the ∧ or ∨ buttons to position the required parameter on the top line of the display, then press the **SELECT** button.

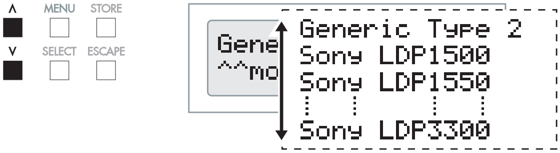


For example, ‘Driver Type’:

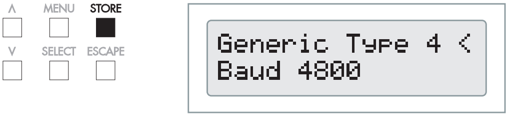
Note: *The ‘**V**’ number on the right-hand side indicates the serial driver version.*



4. From the list of driver names, use the ∧ or ∨ buttons to position the required driver name on the top line of the display. (A full list of standard drivers is given in Appendix E).



When the required driver is displayed, press the **STORE** button to store the setting.



5. When a new serial driver is selected, the **Baud** Rate and Communications **Type** parameters will be set to the defaults defined within the serial driver (see Appendix E).

To change these, return to step 3 and alter the appropriate parameter(s) using the same method; otherwise press the **ESCAPE** button three times to return to the Player Status screen.

Player Control

The ES1561 allows basic operating commands to be transmitted via each of the serial outputs. These are not intended to give full operational control of the connected players but are provided for basic testing and to check that the players are correctly responding to serial commands.

The following functions are available:

- `Index On` (frame / time-code superimposed on video image)
- `Index Off` (video image only)
- `PlayF` (play forward - normal speed)
- `PlayR` (play reverse - normal speed)
- `Still` (still or pause)
- `FFwrd` (fast wind forward)
- `Rewind` (fast wind reverse)
- `Plyr/Flt Rst` (perform a complete player reset)

The option ‘labels’ displayed are those shown when the Language parameter (Parameter Set-up Menu – see page 11-16) is set to English. If, however, if the Symbol language option is chosen, the following command labels will be shown:

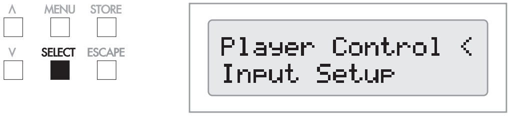
- `Index On`
- `Index Off`
- `>`
- `<`
- `...`
- `>>>`
- `<<<`
- `Plyr/Flt Rst`

IMPORTANT NOTE

The available functions remain the same regardless of the chosen language.

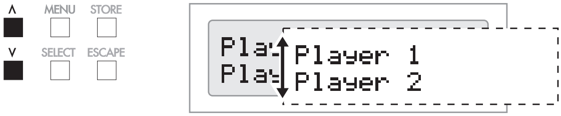
Sending a Player Command

1. Use the **MENU**, ∧ or ∨ buttons to position the Player Control option on the top line of the display, then press the **SELECT** button.



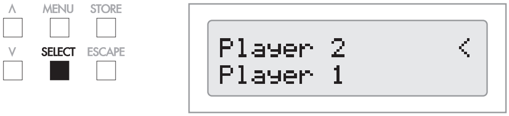
```
Player Control <
Input Setup
```

2. From the list of player numbers,use the ∧ or ∨ buttons to position the required Player on the top line of the display, then press the **SELECT** button.



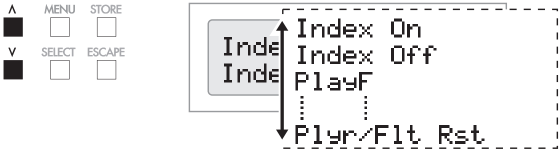
```
Player 1
Player 2
```

For example, ‘Player 2’:



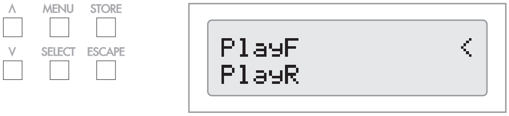
```
Player 2       <
Player 1
```

3. From the list of control functions, use the ∧ or ∨ buttons to position the required function on the top line of the display.



```
Index On
Index Off
PlayF
⋮   ⋮
Plyr/Flt Rst
```

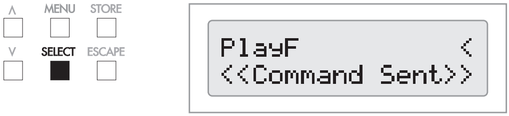
For example, ‘Play Forward’:



```
PlayF          <
PlayR
```

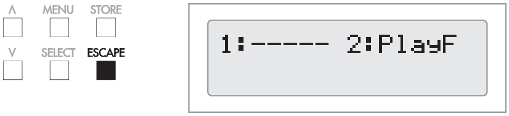
4. To send the command, press the **SELECT** button.

The `<<Command Sent>>` *message will be displayed for approximately 1 second.*



```
PlayF          <
<<Command Sent>>
```

5. Press the **ESCAPE** button three times to return to the Player Status screen.
If the command was sent successfully, it will be displayed next to the appropriate player.



```
1:----- 2:PlayF
```

Input Set-up

This mode is used to view the current status of the switch inputs and to gain access to the various switch parameters:

- **Show** This parameter allows a show / effect to be started within the ES1561 show computer, when a switch input is triggered.

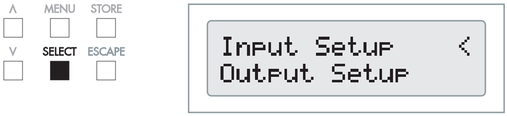
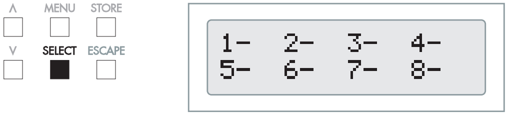
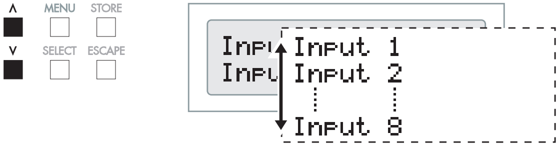
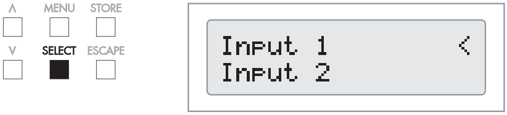
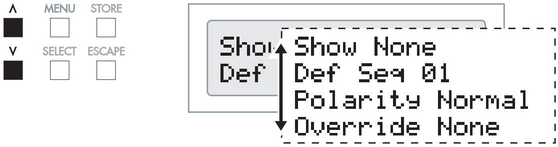
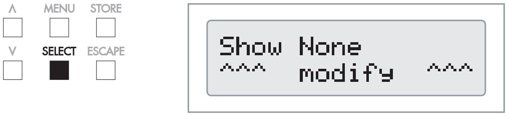
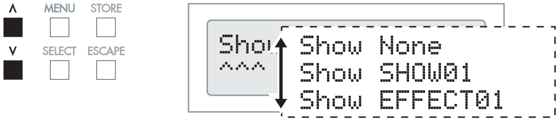
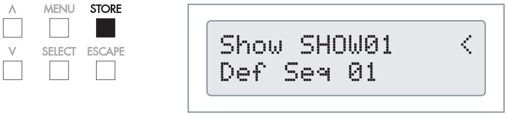
`None`	*(default setting - do nothing)*
`SHOW`*nn*	send Show Start Routine for this show name.
`EFFECT`*nn*	send ‘Run Effect’ R-type for this effect name.

The number *nn* varies accordingto the ‘Show / Efct’ parameter (see page 11-16) and the input number as in the table below:

‘Show/Efct’ Option		**Switch Input Number**							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
01 – 08	values of *nn*	01	02	03	04	05	06	07	08
09 – 16		09	10	11	12	13	14	15	16
17 – 24		17	18	19	20	21	22	23	24
25 – 32		25	26	27	28	29	30	31	32
33 – 40		33	34	35	36	37	38	39	40
41 – 48		41	42	43	44	45	46	47	48
49 – 56		49	50	51	52	53	54	55	56
57 – 64		57	58	59	60	61	62	63	64

- **Def Seq** This parameter allows a switch input to trigger an internal sequence. When set to `None`, no trigger occurs. Otherwise the parameter shows a number (`01` to `08`) which corresponds to the input number and the sequence that it will trigger.
- **Polarity** Defines whether the input responds to switch *closure* (`Normal`) or *opening* (`Reverse`).
- **Override** Allows the current input condition to be overridden, or to be activated when no input is connected, *e.g.* for testing purposes. For further details, refer to page 11-11.

Changing the Input Set-up

1. Use the **MENU**, ∧ or ∨ buttons to position the Input Set-up option on the top line of the display, then press the **SELECT** button. The Input Status screen will be displayed (see page 11-11). Press the **SELECT** button again to open the set-up menu.	 ∧ MENU STORE ∨ SELECT ESCAPE Input Setup < Output Setup  ∧ MENU STORE ∨ SELECT ESCAPE 1- 2- 3- 4- 5- 6- 7- 8-
2. From the list of input numbers,use the ∧ or ∨ buttons to position the required input on the top line of the display, then press the **SELECT** button. *For example, 'Input 1':*	 ∧ MENU STORE ∨ SELECT ESCAPE Input 1 Input 2 Input 8 
3. From the list of input parameters, use the ∧ or ∨ buttons to position the required parameter on the top line of the display, then press the **SELECT** button. *For example, 'Show':*	 ∧ MENU STORE ∨ SELECT ESCAPE Show None Def Seq 01 Polarity Normal Override None  ∧ MENU STORE ∨ SELECT ESCAPE Show None ^^^ modify ^^^
4. Use the ∧ or ∨ buttons to alter the displayed setting.	 ∧ MENU STORE ∨ SELECT ESCAPE Show None Show SHOW01 Show EFFECT01
5. Press the **STORE** button to accept the new setting. *Repeat steps 3, 4 & 5 to change any of the other input parameters.*	 ∧ MENU STORE ∨ SELECT ESCAPE Show SHOW01 < Def Seq 01

Using the Override Function (Input Test)

This function is controlled via the Override parameter within the Input Set-up mode. To use this function, follow steps 1, 2 & 3 listed on page 11-10 to ‘select’ the Override parameter.

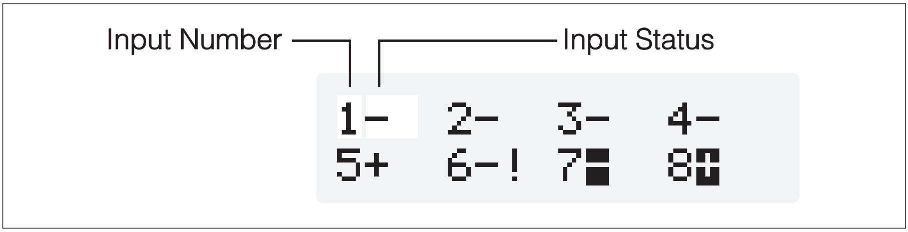
Use the ∧ or ∨ buttons to choose one of the following options:

- `None` override function is disabled (default).
- `Off` Input held in open circuit condition.
- `On` Input held in closed circuit condition.

Press the **STORE** button to invoke the chosen override condition; (note that the **RING 1** indicator will not flash red for this operation). **IMPORTANT – Any show start or sequence start associated with the input will be triggered.**

An On or Off override condition will remain in place until changed or until you **ESCAPE** from the Input Status screen (to the main menu list).

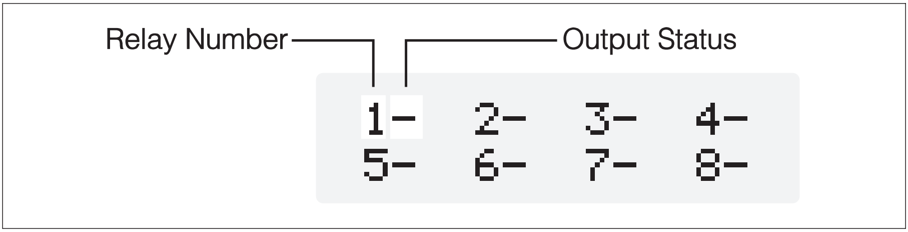
The Input Status Screen



This screen shows the status of the eight switch inputs (numbered 1 to 8). One or two symbols appear against each input number to indicate its current condition or status:

− = Input is open circuit *(as inputs 1,2,3, 4 & 6 above),*
+ = Input is closed circuit *(as input 5 above)*
⊟ = Input has `Override Off` condition applied *(as input 7 above)*
⊞ = Input has `Override On` condition applied *(as input 8 above)*
! = Input Polarity is set to `Reverse` *(as input 6 above)*

Output Setup (internal relays)



This screen shows the current state of the eight internal relays (identified as 1 to 8). The symbol against each relay number indicates its current condition or status:

- – Relay Off (default condition):
  Contact Com and NC are closed; Com and NO are open.
- + Relay On:
  Contact Com and NO are closed; Com and NC are open.

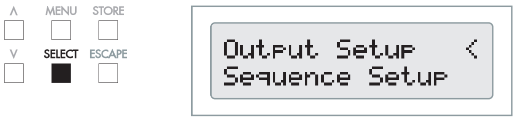
The On / Off condition of each relay is controlled by an ES4000 D-type command either via the **DATA LINK** ring or from an internal sequence. In addition, an override function is provided to test the operation of each relay and any associated external circuitry.

WARNING
If the relay outputs are connected to peripheral devices, take care not to endanger any personnel when using the Output Override function.

Also be careful not to jeopardize system integrity by operating peripheral devices ‘out of sequence’.

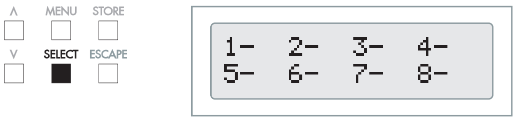
Using the Override Function (Relay Test)

1. Use the **MENU**, ∧ or ∨ buttons to position the Output Set-up option on the top line of the display, then press the **SELECT** button.



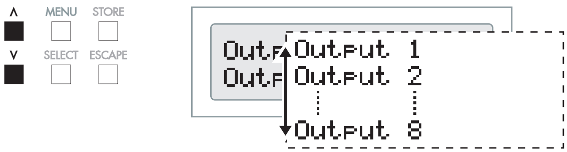
```
Output Setup    <
Sequence Setup
```

The Output Status screen will be displayed (see page 11-12). Press the **SELECT** button again to open the set-up menu.



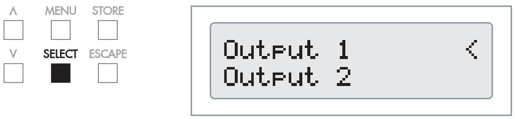
```
1-  2-  3-  4-
5-  6-  7-  8-
```

2. From the list of output numbers,use the ∧ or ∨ buttons to position the required output on the top line of the display, then press the **SELECT** button.



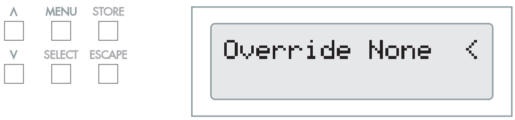
```
Output 1
Output 2
  :      :
Output 8
```

For example, 'Output 1':



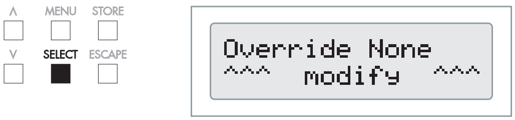
```
Output 1        <
Output 2
```

3. The Override function is the only option available.



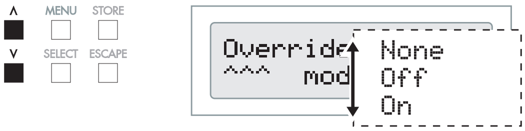
```
Override None   <
```

Press the **SELECT** button to enable the setting to be changed.



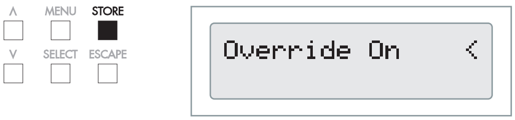
```
Override None
^^^   modify   ^^^
```

4. Use the ∧ or ∨ buttons to alter the displayed setting.



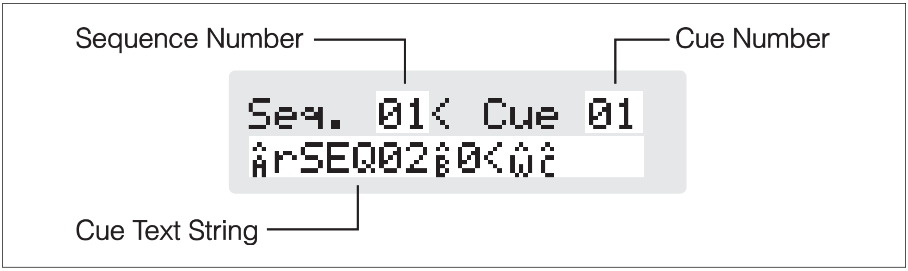
```
None
Off
On
```

5. Press the **STORE** button to accept the new setting.



```
Override On     <
```

Sequence View



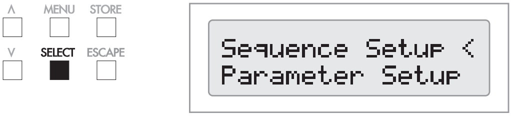
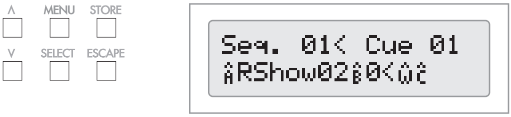
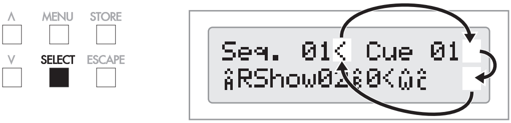
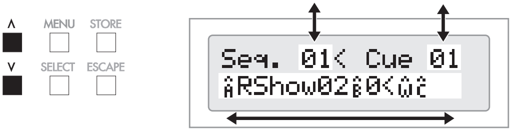
This mode is used to view the 17 internal cue sequences currently held within the ES1561 serial processor memory. Cues cannot be programmed or changed using this screen – this can only be done using the 4-DISC software utility (refer to Appendix H for further details).

Each cue takes the form of an ES4000 protocol command and is displayed in the form of an ASCII text string. The above example shows an R-type command that will cause internal sequence 2 to stop.

If there are no cues associated with the selected sequence number, the cue number field will show ‘`00`’ and the message ‘`No cues in seq.`’ will appear in the cue text area of the display.

NOTE *In the unlikely event that a Sequence contains more than 99 Cues, only the first 99 Cues can be viewed on the display.*

Viewing the Internal Sequences

1. Use the **MENU**, ∧ or ∨ buttons to position the Sequence Setup option on the top line of the display, then press the **SELECT** button.	 ∧ MENU STORE ∨ SELECT ESCAPE Sequence Setup < Parameter Setup
2. The Sequence View screen will then appear.	 ∧ MENU STORE ∨ SELECT ESCAPE Seq. 01< Cue 01 RShow02 0<
3. Press the **SELECT** button to move the move the cursor (<) between the three display fields.	 ∧ MENU STORE ∨ SELECT ESCAPE Seq. 01< Cue 01 RShow02 0<
For the ‘selected’ field: use the ∧ or ∨ buttons to change the sequence or cue number. If the cue text is longer than 15 characters, also use these buttons to scroll the text left or right.	 ∧ MENU STORE ∨ SELECT ESCAPE Seq. 01< Cue 01 RShow02 0<

Parameter Set-up

This menu allows access to the following parameters which are used to define the general set-up of the ES1561 module's serial processor:

- **Address** used to uniquely identify the serial processor on **RING 1** of the show computer for the purpose of ES4000 serial communications — it does not affect any other aspect of the module's operation. This parameter can be set to any value from `01` to `24` (default = `01`); duplicate addresses ***must not*** exist on the same ring.
- **Start Delay** defines whether or not internal sequence 17 is to be started automatically on power-up or reset, and if so, the amount of delay to be applied:

`None`	*(sequence is not called)*
`5s`	*(sequence is called after 5 seconds)*
`15s`	*(sequence is called after 15 seconds)*
`30s`	*(sequence is called after 30 seconds)*

- **Baud** defines the ES4000 (RS-232) baud rate to be used:

`19200` (*default*)	`57600`	`115200`
`38400`	`76800`	

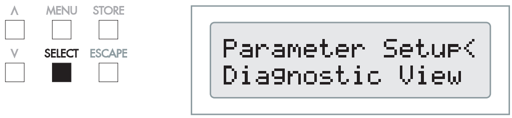
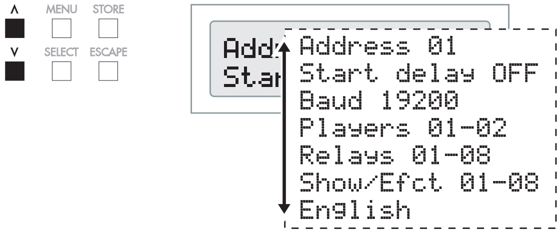
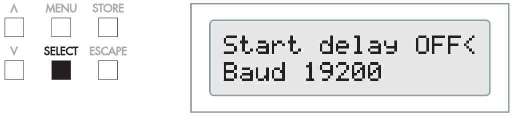
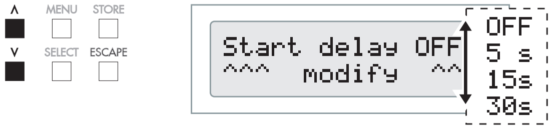
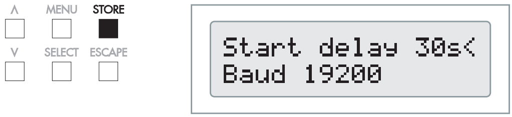
NOTE: *All of the settings use 8 data bits with even parity.*

- **Players** sets the range of the two serial control outputs. By default these are configured as players `01-02`, but can be changed to subsequent blocks of four players (*e.g.* `03-04`, `05-06`, *etc.*) up to `21-22`.
- **Relays** sets the range of the eight internal relays. By default these are configured as relays `01-08`, but can be changed to subsequent blocks of eight relays (*e.g.* `09-16`, `17-24`, *etc.*) up to `89-96`.
- **Show/Efct** sets the range of 'shows' (or 'effects') that can be called by the Show Start routine. By default these are configured as shows `01-08`, but can be changed to subsequent blocks of eight shows (*e.g.* `09-16`, `17-24`, *etc.*) up to `57-64`.

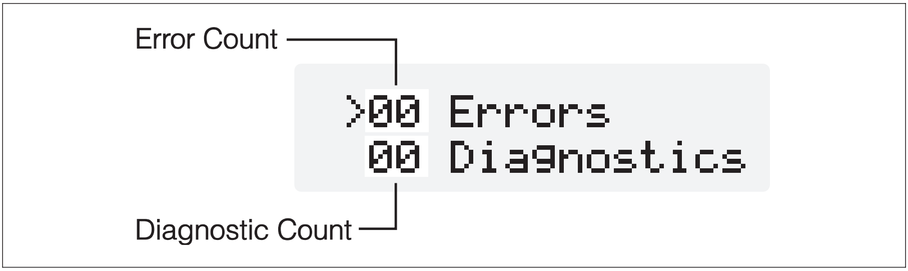
- **Language** defines how serial commands are displayed within menus and on the Player Status screen:
  `English` *commands displayed as words (default).*
  `Symbols` *commands displayed as graphics.*

This setting does not affect messages generated by the show computer.

Changing the Module Set-up Parameters

1. Use the **MENU**, ∧ or ∨ buttons to position the Parameter Set-up option on the top line of the display, then press the **SELECT** button.	 Parameter Setup< Diagnostic View
2. From the list of module parameters, use the ∧ or ∨ buttons to position the required parameter on the top line of the display.	 Address 01 Start delay OFF Baud 19200 Players 01-02 Relays 01-08 Show/Efct 01-08 English
3. Press the **SELECT** button to edit the displayed setting. *For example, 'Start Delay':*	 Start delay OFF< Baud 19200
4. From the list of options, use the ∧ or ∨ buttons to position the required setting on the top line of the display.	 Start delay OFF ^^^ modify ^^ OFF 5 s 15s 30s
5. When the required setting is displayed, press the **STORE** button. *To retain the original setting, press the* **ESCAPE** *button.*	 Start delay 30s< Baud 19200

Diagnostic View



This screen shows if any operational problems have occured with the serial processor unit of the ES1561 (but *not* the show computer). If an abnormal operating condition or an incorrect configuration, a 3-digit code is generated which can be cross-referred to the details given in Appendix G.

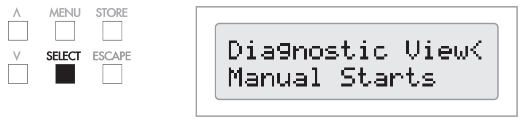
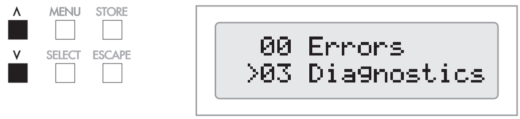
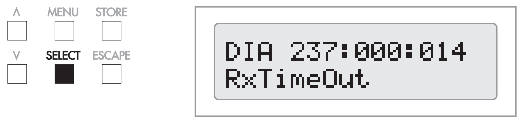
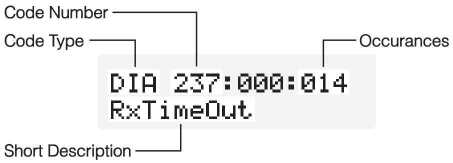
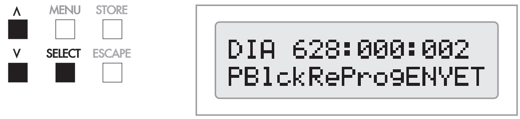
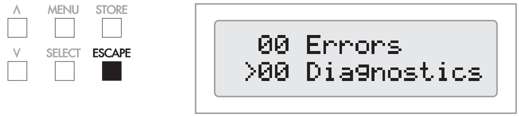
A code is classified as being in one of the following groups:

- **Error** which warns of a problem that will potentially disrupt the correct operation of the module. If a code occurs within this group, the **RING 1** indicator will show red continuously.
- **Diagnostic** which is for ‘advice only’ and will not usually affect operation. These generally occur as the result of incorrect set-up or incompatibility problems. However, certain codes will *always* occur, even during normal operation.

When a code is generated, it will increment the count next to the appropriate code group on this screen. A record of the code(s) is held in memory and can be viewed separately. Further occurrences of the *same* code will not increment the group counter but will be recorded internally (up to a maximum of 255 occurrences).

Turning the module off causes any stored codes to be cleared and the counters to reset to 00.

Viewing & Clearing Diagnostic Codes

1. Use the **MENU**, ∧ or ∨ buttons to position the Diagnostic View option on the top line of the display, then press the **SELECT** button.	 Diagnostic View< Manual Starts
2. The Group Count screen will then appear. Use the ∧ or ∨ buttons to position the cursor (>) against the Error or Diagnostic group.	 00 Errors >03 Diagnostics
3. Press the **SELECT** button to view the first code in the group. Refer to Appendix G for code listings, descriptions and troubleshooting guide.	 DIA 237:000:014 RxTimeOut  DIA 237:000:014 RxTimeOut
4. If there is more than one code, use the ∧ or ∨ buttons to scroll through the list. To clear the displayed code, press the **SELECT** button.	 DIA 628:000:002 PBlckReProgENYET
5. When all the codes have been cleared, the display will revert to the Group Count screen. (To revert to this screen without clearing any codes, press **ESCAPE**.)	 00 Errors >00 Diagnostics

Manual Starts

This menu allows an external show (or effect) or an internal sequence to be started by using the ES1561 module's own control panel, rather than by using the switch inputs. This facility is primarily intended to be used for testing.

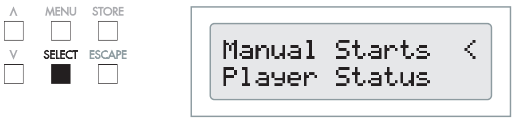
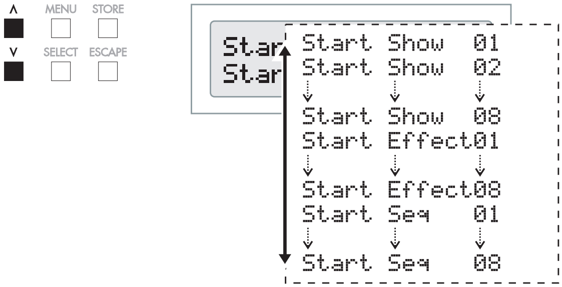
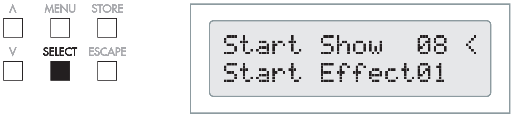
Selecting a Start Show option will initiate a Show Start Routine (see page 10-14) for the appropriate show. This allows one of eight shows to be started provided that they are named using the **SHOW***nn* convention. The range of shows offered (*i.e.* **SHOW01** to **SHOW08**, **SHOW09** to **SHOW16**, *etc.*) is dependent on the setting of the Show / Efct parameter in the Parameter Set-up menu (see page 11-16).

Selecting a Start Effect option will transmit a 'Start Effect' R-type command for the chosen Effect name (*i.e.* **EFFECT01**, **EFFECT02**, *etc.*). As with the Start Show option, the range of Effects is dependent on the setting of the Show / Efct parameter in the Parameter Set-up menu (see page 11-16).

NOTE *The 'Start Effect' option only applies to firmware version 1.2 and above.*

Selecting a Start Seq option will trigger one of the Internal Sequences. Only sequences 01 to 08 are available for manual start.

Manually Starting a Show, Effect or Sequence

1. Use the **MENU**, ∧ or ∨ buttons to position the Manual Starts option on the top line of the display, then press the **SELECT** button.	 Manual Starts < Player Status
2. From the list of Show, Effect and Sequence Start options, use the ∧ or ∨ buttons to position the required option on the top line of the display. **Note:** *The range of Show and Effect numbers listed depend on the Show/Efct parameter in the Parameter Set-up Menu. Sequence numbers will always be 01 to 08.*	 Start Show 01 Start Show 02 Start Show 08 Start Effect01 Start Effect08 Start Seq 01 Start Seq 08
3. To start the show or sequence, press the **SELECT** button. *The message* <<Start Sent>> *will be displayed briefly on the bottom line of the display.*	 Start Show 08 < Start Effect01

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Section 12:
Multi-module Systems

The ES4000 Ring – An Overview

Devices which use the ES4000 communications protocol can be linked together by a data highway known as an ES4000 'ring'.

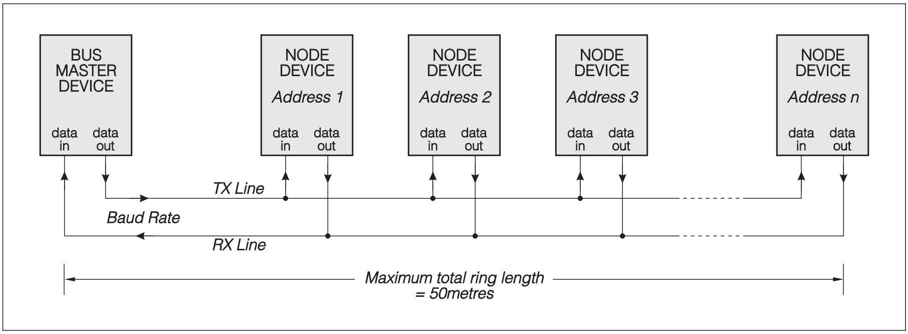


Fig.12-1: Block diagram of an ES4000 ring.

The device which outputs data on to the TX line of the ES4000 ring is defined as the 'bus master' and only one of these can exist on a ring.

Any other devices connected to the highway are defined as 'nodes'; the number of nodes supported depends on the type(s) of device used and the ES4000 protocol.

Within the ESLINX system, the ES1561 is a bus master device and the ES1552, ES1553 and ES1554 modules are all nodes.

NOTE *The bus master cannot control the flow of data which is output by node devices on to the RX line. Therefore, only one node device can reliably send data at one time, otherwise data conflicts/corruption will occur.*

Ring Connections

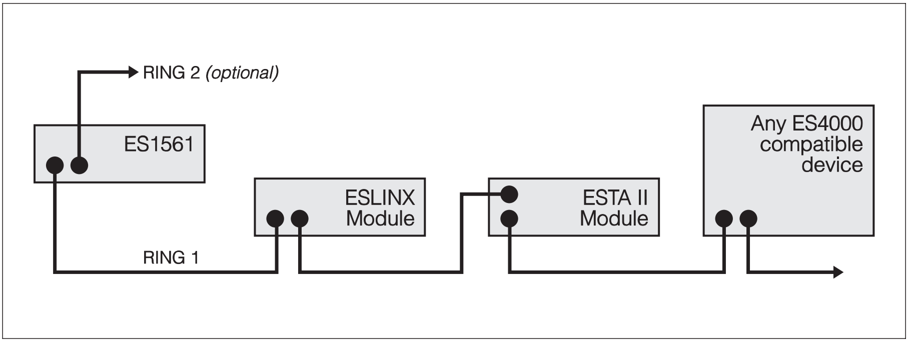


Fig.12-2: Using a ring to link different devices.

The ES1561 Show Control Module is capable of driving two separate rings via the connectors identified as:

- **RING 1** Used for all applications,
- **RING 2.** Used for expansion / larger systems only.

The ES1552, ES1553 and ES1554 modules all have two **DATA LINK** connectors for connection to the ring and for linking 'thru' to the next module. Although both connectors are electrically identical, it is recommended that the following convention is used through the system to simplify any subsequent fault diagnosis:

- Left connector Ring IN (from bus master or previous module);
- Right connector Ring THRU (to next module).

The ring can be linked to any other ES4000-compatible devices (*e.g.* a digital audio Replay Module from the ESTA II range) in the same way.

Address & Baud Rate Settings

There are two parameters which affect the operation of a ring:

- **Address** a unique code number assigned to every node device on the ring. This allows the bus master to transmit data to and receive data from a specific device. The maximum number of nodes that can exist on one one highway is usually limited by the type of devices and / or the type(s) of ES4000 commands being used. The bus master device does not have an Address.
- **Baud Rate** the rate or speed of data transmission. The Baud Rate of the ring is governed solely by the bus master. Each node device must be set to the same Baud Rate to enable correct communication. Remember, not all devices may be capable of running at a particular rate, so generally the rate will be chosen to suit the slowest device on the highway.

The table below gives ring limits when using EASY+ as the application program. The page numbers Address and Baud Rate setting procedures for each ESLINX module are also given:

MODULE	**RING LIMITS**		**SET-UP PROCEDURES**	
	Modules per Ring	**Usable Addresses**	Address	**Baud Rate**
ES1561	1			
show computer		*n/a*	*n/a*	*see note 1*
serial processor		01–24	page 11-16	page 11-16
ES1552	2	00–01 *see note 2*	page 4-4	page 4-13
ES1553	6	01–24	page 6-16	page 6-16
ES1554	6	6	page 8-4	page 8-6

NOTES *1. Baud rate is defined by the application program.*

2. The address setting of the ES1552 also governs the range of F-type and G-type channels used to control the analogue outputs. Only the first 64 channels can be set with EASY+, hence the two module limit.

The ES1561 Module

The ES1561 has the ability to drive two rings – **RING 1** and **RING 2**. All commands generated by the application program are transmitted on *both* rings, except for transmittable comments which are only transmitted on one ring (either 1 or 2 — 1 by default).

The **show computer** within the ES1561 acts as the bus master and, therefore, does not have an address setting. Its Baud Rate setting is controlled from within the application program – usually this will default to 19200 baud. For details on how to alter this setting, refer to the application program's User Guide.

The **serial processor** within the ES1561 module is internally connected to RING 1 and is, therefore, regarded as a separate device (or node); consequently it *does* require an Address. In addition, the Baud Rate setting of the serial processor must be set to match that of the show computer.

Common Switch Inputs

In multi-module applications which utilise the opto-isolated switch inputs, the inputs of several modules may be linked to a common switch. For example, to start an internal sequence on several different modules at the same time.

In such applications, the following criteria must be observed:

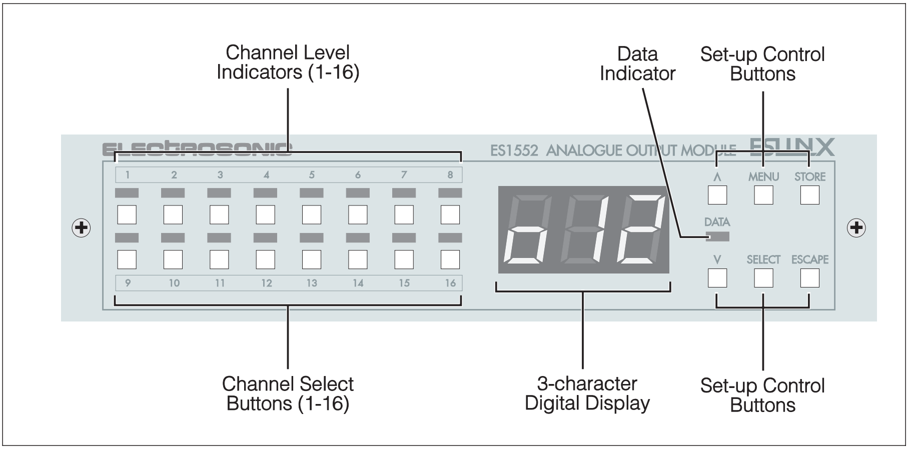
- the input COM and 0V connections of each module must be linked to provide a common voltage reference.
- the total current requirement for all inputs must not exceed the capability of the internal 12V supply.

Appendix A:
Technical Data - ES1552

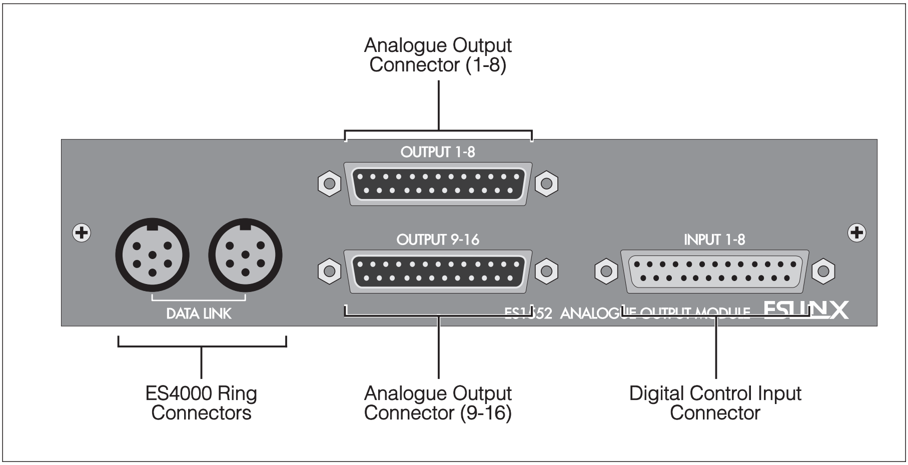
This appendix provides technical information on the ESLINX ES1552 Analogue Output Module.

ES1552 Analogue Output Module

Front Panel Features



Back Panel Connectors


Analogue Output Connector (1-8)
OUTPUT 1-8
OUTPUT 9-16
INPUT 1-8
DATA LINK
ES1552 ANALOGUE OUTPUT MODULE
ESLINX
ES4000 Ring Connectors
Analogue Output Connector (9-16)
Digital Control Input Connector

General Description

The ES1552 provides 16 analogue control outputs, each variable between 0V and 10V d.c. These outputs can be used to directly control a wide variety of devices from (*e.g.* electronic ballasts or dimmers), or via a suitable interface to control devices such as electric motors.

The output voltages are set using ES4000 protocol (from software packages such as **EASY+**and **BSC**). The ES1552 can also store 8 ‘scenes’ of 16 channel levels which can be programmed and recalled using the ES4000 protocol. The scenes can also be recalled by remote switch closures.

Physical Details

Overall Dimensions: 177.0mm (W) x 288.0mm (D) x 40.5mm (H)
Weight: 0.4kg.
Operating Conditions: Ambient temperature: 10 to 30C.
Ambient humidity (max): 80% non-condensing.

Power Requirements

The ES1552 is designed to be installed in (and powered by) an ES1520, ES1550 or ES1560 enclosure. A suitable cable assembly is provided with the enclosure for connecting the module to the power supply.

Supply Voltages: +5V d.c. @ 250mA;
+24Vd.c. @ 550 to 650mA;
– 12Vd.c. @ 100 to 200mA.
} *max. current depends on loading of* ±12V *lines*
Mating Connector : 6-pin (0.156" pitch) Molex® (5180 series).
Connection Detail:
1 +24V d.c.
2 +5V d.c.
3 +5V d.c.
} *pins linked internally*
4 0V ground
5 0V ground
} *pins linked internally*
6 –12V d.c.

Control Panel Overview

The ES1552 Module has various internal parameters which define its operating configuration. These are factory-set to the most commonly-used values but may be altered using the set-up control buttons on the front panel; settings are displayed on the 3-character digital display.

☞ Press **MENU** or **ESCAPE** to step forward or backward through the various menu modes/settings. To change the value of the displayed setting, use the ∧ or ∨ buttons. To select a parameter option press the **SELECT** button unless otherwise stated:

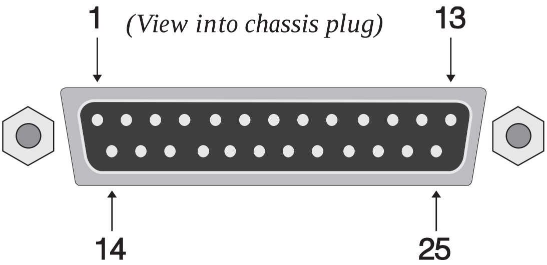
MENU MODES/SETTINGS	**DEFAULT (or typical) DISPLAY SETTINGS**	**PARAMETER OPTIONS**
Power-up Self Test	8.8.8.	
& Firmware Version	v 1.0	
Address Mode	A00	A00 = chans 01–16 A01 = chans 17–32 A02 = chans 33–48 A03 = chans 49–64 A04 = chans 65–80 *....etc.* Press the **STORE** button to save.
Output Channel/Level Mode		
Channel Number (*e.g.* 3)	o03	Press Channel Select button 1–16 to change channel.
Channel Level (*e.g.* 4.25V)	4.25	Use the ∧ and ∨ buttons to manually adjust channel level.
Output Response Mode	o_L	o_L = Last level o_h = Highest level
Input Response Mode	i_L	i_L = Last event i_P = Priority event *(SW8 has highest priority)*

MENU MODES/SETTINGS	DEFAULT (or typical) DISPLAY SETTINGS	PARAMETER OPTIONS
Button Lock Mode **Note**: *to release button lock, turn the module off and back on again.*	i_U	i_U = Unlocked i_C = Locked
Scene Number/Levels Mode Scene Number (*e.g.* 7) Channel Level (*e.g.* 6.75V)	S07 6.75	Use ∧ or ∨ buttons to choose number. Press **SELECT** to recall the scene. Press Channel Select button 1–16 to view a channel level.
Baud Rate Mode	b 19	b 19 = 19200 b38 = 38400 b57 = 57600 b 76 = 76800 b 11 = 115200
Diagnostic Mode	d i0	*This feature is not yet implemented.*

Channel Level Indicators	These indicators show the relative levels of the sixteen analogue outputs by varying brightness (*i.e.* unlit when output is at zero; fully lit when output is at maximum).
Channel Select Buttons	These are used to select one of the 16 channels in order to view or change parameters for that particular channel.
DATA Indicator	Pulses ***green*** when a valid RS-232 command (ES4000 protocol) is being received via the **DATA LINK** connector. Pulses ***red*** six times (two bursts of three) when data or new set-up parameters are being saved to the internal memory. Continuously ***red*** during a fade. Flashes ***red*** continuously if an error is detected. Shows ***orange*** when both green or red indications occur simultaneously, and also during the initialisation sequence following power-up. Remains *off* at all other times.

Analogue Output Connector (OUTPUT 1-8 & 9-16)

There are two connectors which provide connections for channel outputs 1–8 and 9–16 respectively.


(View into chassis plug)

Mating Connector: 25-pin D-type (female) with metal cover [2 off].

Pin-out Details:

1	0V	**14**	Ch7 *or* Ch15
2	Ch1 *or* Ch9	**15**	0V
3	0V	**16**	Ch8 *or* Ch16
4	Ch2 *or* Ch10	**17**	0V
5	0V	**18**	*No connection.*
6	Ch3 *or* Ch11	**19**	*No connection.*
7	0V	**20**	*No connection.*
8	Ch4 *or* Ch12	**21**	*No connection.*
9	0V	**22**	*No connection.*
10	Ch5 *or* Ch13	**23**	*No connection.*
11	0V	**24**	*No connection.*
12	Ch6 *or* Ch14	**25**	*No connection.*
13	0V	**Cover**	= Screen

Output Voltage: 0 to +10V d.c.

Output Current: 10mA (source or sink).

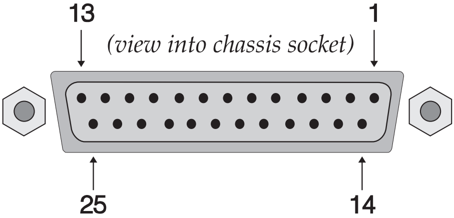
Output Resolution: 12-bit.

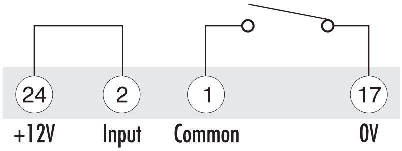
Update (per channel): every 25ms.

Output Response: Last requested voltage *(default)*;
Highest requested voltage *(user set-up)*.

Digital Control Input Connector (INPUT 1-8)

This connector provides access to the eight switch-control inputs used for selecting ‘scenes’. In addition, a 12V supply (internally limited to 200mA) and 0V connection are provided for use with the switch inputs. To activate an input connect its ‘Input’ terminal to +12V and ‘Common’ terminal to 0V. All ‘Common’ terminals are electrically isolated.




Example method using SW1 input

Mating Connector: 25-pin D-type (male) with metal cover.

Pin-out Details:

1	SW1 Common	**14**	SW7 Input	
2	SW1 Input	**15**	SW8 Common	
3	SW2 Common	**16**	SW8 Input	
4	SW2 Input	**17**	0V	*linked internally*
5	SW3 Common	**18**	0V	
6	SW3 Input	**19**	*No connection.*	
7	SW4 Common	**20**	*No connection.*	
8	SW4 Input	**21**	*No connection.*	
9	SW5 Common	**22**	*No connection.*	
10	SW5 Input	**23**	*No connection.*	
11	SW6 Common	**24**	12V	*(linked internally)* *200mA maximum*
12	SW6 Input	**25**	12V	
13	SW7 Common	**Cover** = Screen		

Input Type: Opto-isolated.

Nominal Input Voltage: +12V *(w.r.t. SW Common connection).*

Absolute Input Range: +5V to +24V *(w.r.t. SW Common connection).*

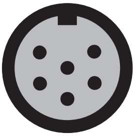
Input Current: 15mA @ 12V *(limited by internal 680Ω resistor).*

Input Priority: Last event *(default)*;
Highest event (SW8 is highest) *(user set-up)*

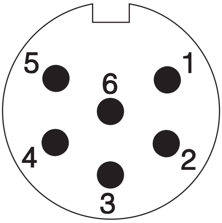
Debounce Delay: 10 ms (approx.).

ES4000 Ring Connectors (DATA LINK)

These two connectors are used for RS-232 remote control applications using the Electrosonic ES4000 protocol. Both connectors are electrically and functionally identical to allow for 'link through' of data highways or 'rings'. For details on ES4000 ring usage, please refer to Section 12.



(View into chassis socket)



Mating Connector:	6-pin DIN (male).
Pin-out Details:	**1** RS-232 data out / thru.
	2 +12V supply *(limited to 100mA).*
	3 Link through.
	4 –12V supply *(limited to 100mA).*
	5 RS-232 data in / thru.
	6 Ground (0V).
	Casing = Screen
Recommended Cable:	6-core plus overall screen (low capacitance);
Min. Core Size:	0.22mm^2 per core.
Max. Cable Length:	50m *(total length of ring).*
Control Protocol (RS-232):	ES4000 F-type, G-type, & g-type.
Max. Number of Nodes:	24 *(subject to application).*

IMPORTANT NOTE

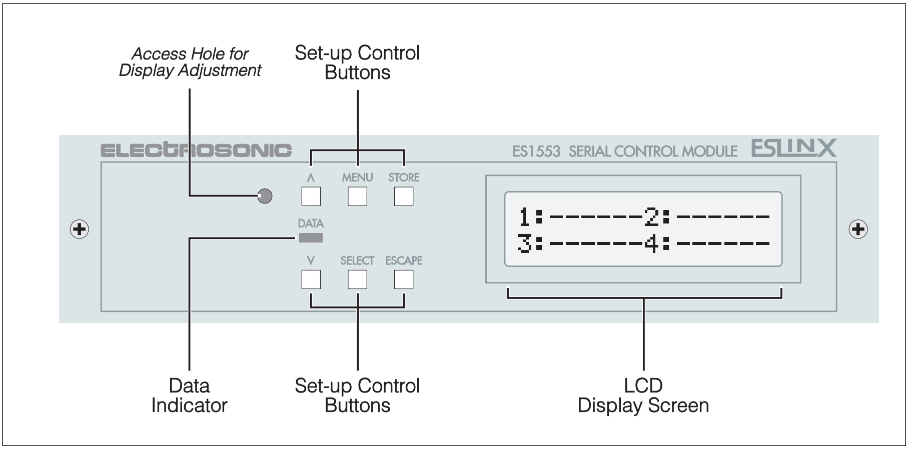
When the cable is to be used to connect between two modules mounted in an ES1560 Twin Module Case, a ferrite bead must be fitted near to the plug at both ends of the cable.

Appendix B:
Technical Data - ES1553

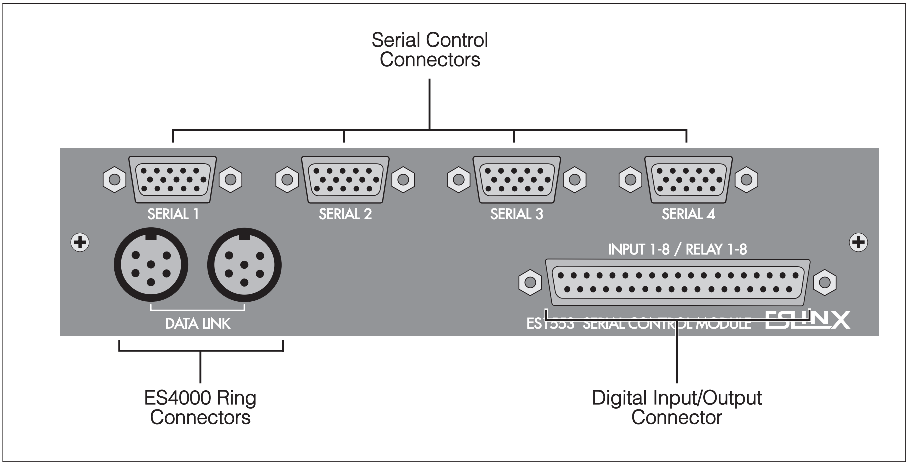
This appendix provides technical information on the ESLINX ES1553 Serial Control Module.

ES1553 Serial Control Module

Front Panel Features



Back Panel Connectors



General Description

The ES1553 Serial Control Module provides remote control of up to four devices in response to ES4000 protocol commands or switch inputs.

Various down-loadable serial drivers are included which are suitable for controlling a wide variety of equipment, such as Video Disc Players, Video / Audio Tape Players and CD Players (see Appendix E: Serial Drivers).

In addition, the module offers eight internal relays which can be employed for any user-defined low-voltage application, together with eight switch inputs for triggering shows or internal cue sequences.

Physical Details (module only)

Overall Dimensions: 177.0mm (W) x 288.0mm (D) x 40.5mm (H)
Weight: 0.4kg.
Operating Conditions: Ambient temperature: 10 to 30C.
Ambient humidity (max): 80% non-condensing.

Power Requirements

The ES1553 is designed to be installed in (and powered by) an ES1520, ES1550 or ES1560 enclosure. A suitable cable assembly is provided with the enclosure for connecting the module to the power supply.

Supply Voltages: +5Vd.c. @ 330mA;
+24Vd.c. @ 75 to 175mA; } *max. current depends*
– 12Vd.c. @ 10 to 110mA. } *on loading of* ±12V
lines
Mating Connector : 6-pin (0.156" pitch) Molex® (5180 series).
Connection Detail: **1** +24V d.c.
2 +5V d.c. } *pins linked internally*
3 +5V d.c. }
4 0V ground } *pins linked internally*
5 0V ground }
6 –12V d.c.

Control Panel Overview

∧ & ∨ Buttons	Move up or down through menu, parameter and option lists.
MENU Button	Move to next menu.
ESCAPE Button	Move back one level in the menu hierachy. Repeated presses will return the display to the Player Status mode.
SELECT Button	Move to a sub-menu or parameter list. Also 'selects' a parameter from a list to enable a new option to be chosen.
STORE Button	Saves a new parameter option to the internal memory.

MENU LIST & SUB MENUS	PARAMETERS	OPTIONS
Player Status	*Shows last commands sent to Serial Ouputs.*	
Player Setup Player 1 - 4	**Driver Type:**	*Various.*
	Baud Rate:	1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200, Special.
	Data Bits:	8, 7, 6, 5.
	Parity:	None, Odd, Even.
	Communications Type:	RS-232, RS-422, RS-485, IR.
	Disk Type:	CAV, CLV.
	Video Standard:	PAL, NTSC.
Player Control Player 1 - 4		Index On, Index Off, PlayF, PlayR, Still, Ffwrd, Rewind, Plyr / Flt Rst.
Input Setup Input 1 - 8	**Show:**	None, SHOW*nn*, EFFECT*nn*.
	Def Seq:	None, *nn*.
	Polarity:	Normal, Reverse.
	Override:	None, Off, On.
Output Setup Output 1 - 8	**Override:**	None, Off, On.
Sequence Setup	*Allows viewing of internal sequence cues.*	

MENU LIST & SUB MENUS	**PARAMETERS**	**OPTIONS**
`Parameter Setup`	**Address:** **Start Delay:** **Baud:** **Players:** **Relays:** **Show/Efct:** **Language:**	01 *to* 24. None, 5s, 15s, 30s. 19200, 38400, 57600, 76800, 115200. 01–04 *to* 21–24 01–08 *to* 89–96 01–08 *to* 56–64 English, Symbols.
`Diagnostic View`	*Allows viewing of Error/Diagnostic codes with ∧ & ∨ buttons; press* **SELECT** *button to clear a code.*	
`Manual Starts`		Start Show *nn*, Start Effect *nn*, Start Sequence *nn*.

DATA Indicator Pulses ***green*** when a valid RS-232 command (ES4000 protocol) is being received via the **DATA LINK** connector.

Pulses ***red*** when new set-up parameters are being saved to the internal memory.

Shows ***orange*** when both of the above conditions occur simultaneously, and also during the initialisation sequence following power-up.

Shows ***red*** continuously if an error code is generated.

Remains *off* at all other times.

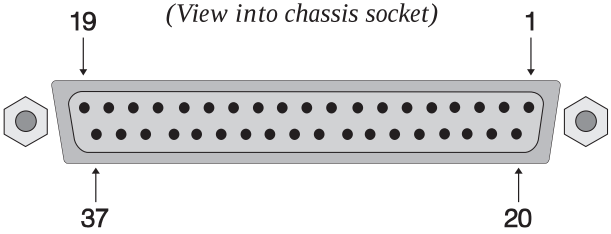
LCD Display

Type: Liquid Crystal (with back lighting).
Back light colour: Green.
Active Display Area: approx. 55.5mm(W) x 10.5mm(H).
Display Format: 16 characters x 2 rows.

The LCD display is factory-set for optimum contrast. After a period of time, this may need to be adjusted slightly by fine-tuning a small preset resistor (accessible through the hole in the front panel). To adjust the contrast, use an insulated trimmer adjusting tool (not a metal screwdriver) to turn the preset.

Digital I/O Connector (INPUT 1-8 / RELAY 1-8)

This connector provides access to the eight switch-control inputs and also to the contacts of the eight internal relays. In addition, a 12V supply (internally limited to 100mA) and 0V connection are provided for use with the switch inputs; see the next page for an example of input usage.



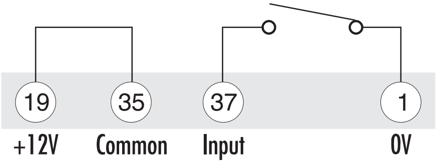
(View into chassis socket)

Mating Connector:	37-pin D-type (male) with metal cover.			
Pin-out Details:	**1**	Ground 0V.	**20**	Relay 8-NO.
	2	Relay 8-NC.	**21**	Relay 8-Com.
	3	Relay 7-NO.	**22**	Relay 7-NC.
	4	Relay 7-Com.	**23**	Relay 6-NO.
	5	Relay 6-NC.	**24**	Relay 6-Com.
	6	Relay 5-NO.	**25**	Relay 5-NC.
	7	Relay 5-Com.	**26**	Relay 4-NO.
	8	Relay 4-NC.	**27**	Relay 4-Com.
	9	Relay 3-NO.	**28**	Relay 3-NC.
	10	Relay 3-Com.	**29**	Relay 2-NO.
	11	Relay 2-NC.	**30**	Relay 2-Com.
	12	Relay 1-NO.	**31**	Relay 1-NC.
	13	Relay 1-Com.	**32**	SW7 & 8 Com.
	14	SW8 Input.	**33**	SW7 Input.
	15	SW5 & 6 Com.	**34**	SW6 Input.
	16	SW5 Input.	**35**	SW1, 2, 3, 4 Com.
	17	SW4 Input.	**36**	SW3 Input.
	18	SW2 Input.	**37**	SW1 Input.
	19	12V @ 100mA.	**Cover**	= Screen

SWITCH-CONTROL INPUTS:

Input Type: Opto-isolated (bi-directional).
Nominal Input Voltage: +12V *(w.r.t. SW Com connection).*
Absolute Input Range: ± 5V to ± 24V.
Input Current: 15mA @ 12V *(limited by internal 680Ω resistor).*
Input Response (Polarity): Active-low *(default)*; Active-high *(user set-up)*
Debounce Delay: 10 milliseconds (approx.).

Example method using SW1 input



NOTE *The opto-isolators are bi-directional to allow for common negative, common positive or a.c. systems.*

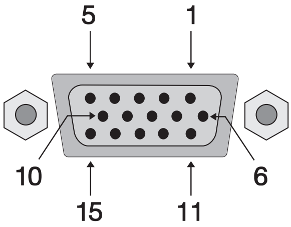
RELAY CONTACTS:

Contact Arrangement: Single-pole changeover.
Contact Rating: 24V a.c. @ 0.2A;
50V d.c. @ 0.2A.

WARNING:
These relay contacts are ***not*** *safety isolated and are* ***not suitable for mains voltage operation.***

Serial Control Connectors (SERIAL 1 - 4)

These four connectors are functionally identical and are used to provide remote control of external devices such as Laser Disk Players or Video Tape Players, etc. The output is configurable (via local set-up or ES4000 commands) to the appropriate device type with RS-232, RS-422, RS-485 or IR (Infra-red) standards.



(View into chassis socket)

Mating Connector: 15-pin ‘High Density’ D-type (female) with metal cover.

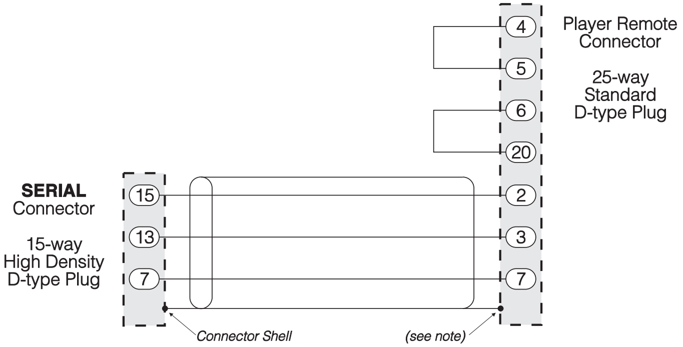
Pin-out Details:

1	RS-422 Tx B(–) *or* RS-485 B(–).	
2	RS-422 Tx A(+) *or* RS-485 A(+).	
3	IR Opto Emitter.	
4	RS-422 Rx B(–).	
5	RS-422 Rx A(+).	
6	Ground (0V)	*linked internally*
7	Ground (0V)	
8	*No connection.*	
9	+5V	*linked internally* — *must be externally limited to < 1A.*
10	+5V	
11	IR Opto Collector.	
12	IR Diode Drive (anode) – *use with 0V (cathode).*	
13	RS-232 Tx.	
14	*No connection.*	
15	RS-232 Rx.	

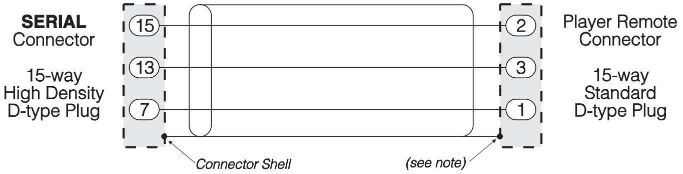
Cover = Screen

Examples of Player Control Cables

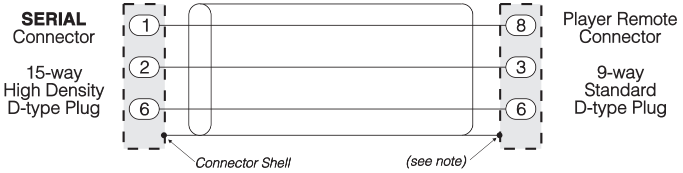
(a) RS-232 using Standard 25-way D-type Plug



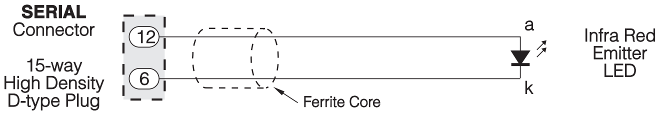
(b) RS-232 using Standard 15-way D-type Plug



(c) RS-422 using Standard 9-way D-type Plug



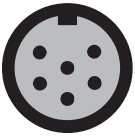
(d) IR (infra-red)



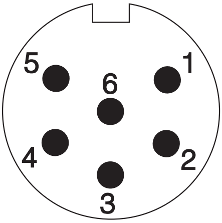
NOTE *Check player operating manual for cover type and screen connection.*

ES4000 Ring Connectors (DATA LINK)

These two connectors are used for RS-232 remote control applications using the Electrosonic ES4000 protocol. Both connectors are electrically and functionally identical to allow for ‘link through’ of data highways or ‘rings’. For details on ES4000 ring usage, please refer to Section 12.



(View into chassis socket)



Mating Connector: 6-pin DIN (male).

Pin-out Details:
1 RS-232 data out / thru.
2 +12V supply *(limited to 100mA)*.
3 Link through.
4 –12V supply *(limited to 100mA)*.
5 RS-232 data in / thru.
6 Ground (0V).
Casing = Screen

Recommended Cable: 6-core plus overall screen;
Capacitance must be <0.22mm^2 per core.
Max. Cable Length: 50m *(total length of ring)*.
Control Protocol (RS-232): ES4000 H-type, h-type, D-type (standard & extended format), d-type, R-type, r-type, S-type, Z-type, Y-type.
Max. Number of Nodes: 24 *(subject to application)*.

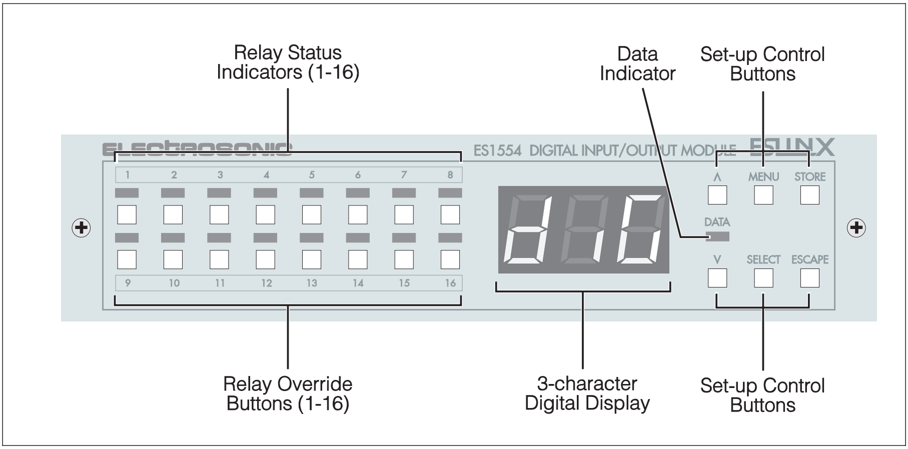
IMPORTANT NOTE
When the cable is to be used to connect between two modules mounted in an ES1560 Twin Module Case, a ferrite bead must be fitted near to the plug at both ends of the cable.

Appendix C:
Technical Data - ES1554

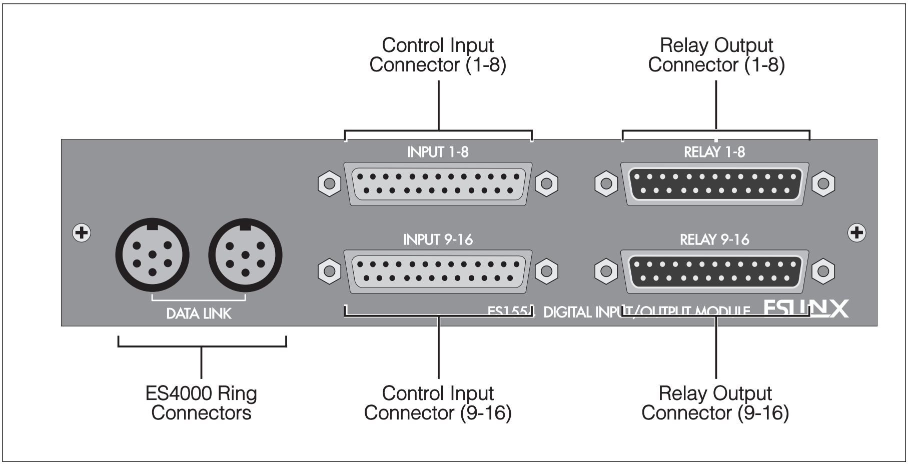
This appendix provides technical information on the ESLINX ES1554 Digital Input/Output Module.

ES1554 Digital Input/Output Module

Front Panel Features



Back Panel Connectors


Control Input Connector (1-8)
Relay Output Connector (1-8)
INPUT 1-8
RELAY 1-8
INPUT 9-16
RELAY 9-16
DATA LINK
ES1554 DIGITAL INPUT/OUTPUT MODULE
ESLINX
ES4000 Ring Connectors
Control Input Connector (9-16)
Relay Output Connector (9-16)

General Description

The ES1554 provides 16 relay outputs, each comprising a single pole change-over. The operation of each relay can be controlled via the front panel buttons, switch inputs or via the ES4000 serial **DATA LINK**.

The module can also be configured to send ES4000 remote show control commands in response to the front panel buttons or switch inputs, and to send messages about the On / Off status of the switch inputs.

Physical Details

Overall Dimensions:	177.0mm (W) x 288.0mm (D) x 40.5mm (H)	
Weight:	0.4kg.	
Operating Conditions:	Ambient temperature:	10 to 30C.
	Ambient humidity (max):	80% non-condensing.

Power Requirements

The ES1554 is designed to be installed in (and powered by) an ES1520, ES1550 or ES1560 enclosure. A suitable cable assembly is provided with the enclosure for connecting the module to the power supply.

Supply Voltages:	+5V d.c. @ 400mA;	
	+24Vd.c. @ 150 to 250mA;	*max. current depends on loading of* ±12V *lines*
	– 12Vd.c. @ 10 to 110mA.	
Mating Connector :	6-pin (0.156" pitch) Molex® (5180 series).	

Connection Detail:	**1**	+24V d.c.	
	2	+5V d.c.	*pins linked internally*
	3	+5V d.c.	
	4	0V ground	*pins linked internally*
	5	0V ground	
	6	–12V d.c.	

Control Panel Overview

The ES1554 Module has various internal parameters which define its operating configuration. These are factory-set to the most commonly-used values but may be altered using the set-up control buttons on the front panel; settings are displayed on the 3-character digital display.

☞ Press **MENU** or **ESCAPE** to step forward or backward through the various menu modes / settings. To change the value of the displayed setting, use the ∧ or ∨ buttons. To save the currently displayed parameter setting as a power-up default, press the **STORE** button:

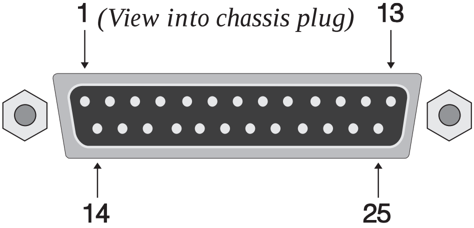
MENU MODES/SETTINGS	**DEFAULT DISPLAY SETTINGS**	**PARAMETER OPTIONS**
Default Start-up Display	diG	
Firmware Version/Defaults	v 1.2	v 1.2 = version no. dEF = defaults... ...press **SELECT** to recall factory-set defaults; press **STORE** to save all current settings as power-up defaults.
Address Mode Address Number	A01	A01 = relays 01–16 A02 = relays 17–32 A03 = relays 33–48 A04 = relays 49–64 A05 = relays 65–80 A06 = relays 81–96
Bank Number	b 1	*Reserved for future use – do not alter.*
Serial Set-up Mode Baud Rate	19.2	480 = 4800 960 = 9600 19.2 = 19200 38.4 = 38400 57.6 = 57600 115 = 115200

MENU MODES/SETTINGS	DEFAULT DISPLAY SETTINGS	PARAMETER OPTIONS
Parity	PE	PE = Even Po = Odd Pn = None
Data Bits	d8	d8 = 8 Bits d7 = 7 Bits d6 = 6 Bits
Stop Bits	S.1	S.1 = 1 Bit S.1.5 = 1½ Bits S.2 = 2 Bits
Button Lock/Unlock Mode	i_o	i_o = Unlocked i_L = Locked
Input Response Mode	PoL	PoL = Poll int = Interrupt rEL = Relay
Show Control Options	nS.t	nS.t = No start Anc = Ancor ucU = VCU ALL = ES Routine

Relay Status Indicators	These indicators show the current state of each relay: *Off* = relay off, *On* = relay on, *Flashing* = serial control disabled.
Relay Override Buttons	These buttons are used to manually turn each relay on or off, or to disable serial control of individual relays. They may also be used to provide remote show start operation.
DATA Indicator	Pulses ***green*** when a valid RS-232 command (ES4000 protocol) is being received via the **DATA LINK** connector. Pulses ***red*** once when data or new set-up parameters are being saved to the internal memory. Shows ***orange*** when both green or red indications occur simultaneously, and also during power-up initialisation. Remains ***off*** at all other times.

Relay Output Connectors (OUTPUT 1-8 & 9-16)

These connectors provide access to the contacts of the sixteen internal relays (eight relays per connector). There are three contacts associated with each relay; when the relay is ‘Off’, Com makes with NC; when the relay is ‘On’, Com makes with NO.


(View into chassis plug)

Mating Connector: 25-pin D-type (female) with metal cover.

Pin-out Details:

1	Ground 0V.	**14**	Relay 1 *or* 9 NC.
2	Relay 1 *or* 9 Com.	**15**	Relay 1 or 9 NO.
3	Relay 2 *or* 10 NC.	**16**	Relay 2 *or* 10 Com.
4	Relay 2 *or* 10 NO.	**17**	Relay 3 *or* 11 NC.
5	Relay 3 *or* 11 Com.	**18**	Relay 3 *or* 11 NO.
6	Relay 4 *or* 12 NC.	**19**	Relay 4 *or* 12 Com.
7	Relay 4 *or* 12 NO.	**20**	Relay 5 *or* 13 NC.
8	Relay 5 *or* 13 Com.	**21**	Relay 5 *or* 13 NO.
9	Relay 6 *or* 14 NC.	**22**	Relay 6 *or* 14 Com.
10	Relay 6 *or* 14 NO.	**23**	Relay 7 *or* 15 NC.
11	Relay 7 *or* 15 Com.	**24**	Relay 7 *or* 15 NO.
12	Relay 8 *or* 16 NC.	**25**	Relay 8 *or* 16 Com.
13	Relay 8 *or* 16 NO.	**Cover** = Screen.	

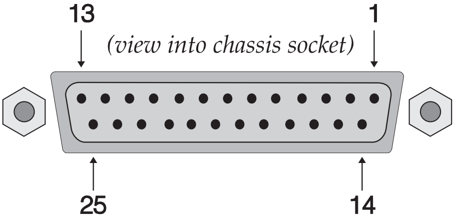
Contact Arrangement: Single-pole changeover.

Contact Rating: 24V a.c. @ 0.2A;
50V d.c. @ 0.2A.

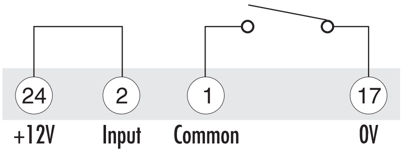
> ***WARNING:***
> *These relay contacts are **not** safety isolated and are **not suitable for mains voltage operation.***

Control Input Connectors (INPUT 1-8 & 9-16)

These connectors provide access to the sixteen ‘switch’ inputs used for operating relays or providing remote show control (eight inputs per connector). A 12 Volt supply (internally limited to 200mA) and 0V connection are provided for use with the switch inputs. To activate an input connect its ‘Input’ terminal to +12V and ‘Common’ terminal to 0V. All ‘Common’ terminals are electrically isolated.



Example method using SW1 input



Mating Connector: 25-pin D-type (male) with metal cover.

Pin-out Details:

1	SW1 *or* 9 Common	**14**	SW7 *or* 15 Input	
2	SW1 *or* 9 Input	**15**	SW8 *or* 16 Common	
3	SW2 *or* 10 Common	**16**	SW8 *or* 16 Input	
4	SW2 *or* 10 Input	**17**	0V	*linked internally.*
5	SW3 *or* 11 Common	**18**	0V	
6	SW3 *or* 11 Input	**19**	*No connection.*	
7	SW4 *or* 12 Common	**20**	*No connection.*	
8	SW4 *or* 12 Input	**21**	*No connection.*	
9	SW5 *or* 13 Common	**22**	*No connection.*	
10	SW5 *or* 13 Input	**23**	*No connection.*	
11	SW6 *or* 14 Common	**24**	12V	*linked internally. 200mA max.*
12	SW6 *or* 14 Input	**25**	12V	
13	SW7 *or* 15 Common	**Cover**	= Screen	

Input Type: Opto-isolated.

Nominal Input Voltage: +12V *(w.r.t. SW Common connection).*

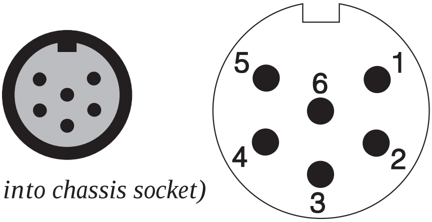
Absolute Input Range: +5V to +24V *(w.r.t. SW Common connection).*

Input Current: 15mA @ 12V *(limited by internal 680Ω resistor).*

Debounce Delay: 10 ms (approx.).

ES4000 Ring Connectors (DATA LINK)

These two connectors are used for RS-232 remote control applications using the Electrosonic ES4000 protocol. Both connectors are electrically and functionally identical to allow for 'link through' of data highways or 'rings'. For details on ES4000 ring usage, please refer to Section 12.



(View into chassis socket)

Mating Connector: 6-pin DIN (male).

Pin-out Details:

1 RS-232 data out / thru.
2 +12V supply *(limited to 100mA).*
3 Link through.
4 –12V supply *(limited to 100mA).*
5 RS-232 data in / thru.
6 Ground (0V).
Casing = Screen.

Recommended Cable: 6-core plus overall screen (low capacitance);
Min. Core Size: 0.22mm^2 per core.
Max. Cable Length: 50m *(total length of ring).*

Control Protocol (RS-232): ES4000 D-type (normal & extended), d-type, QD-type, UD-type.
Max. Number of Nodes: 24 *(subject to application).*

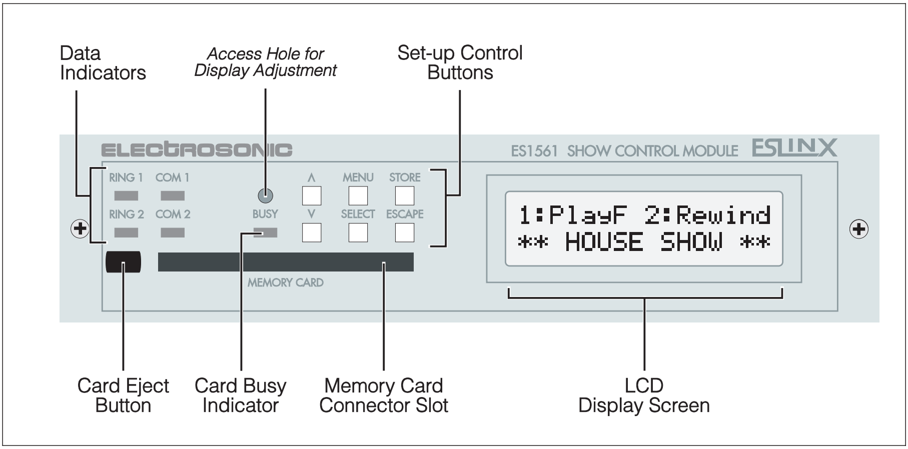
IMPORTANT NOTE
When the cable is to be used to connect between two modules mounted in an ES1560 Twin Module Case, a ferrite bead must be fitted near to the plug at both ends of the cable.

Appendix D:
Technical Data - ES1561

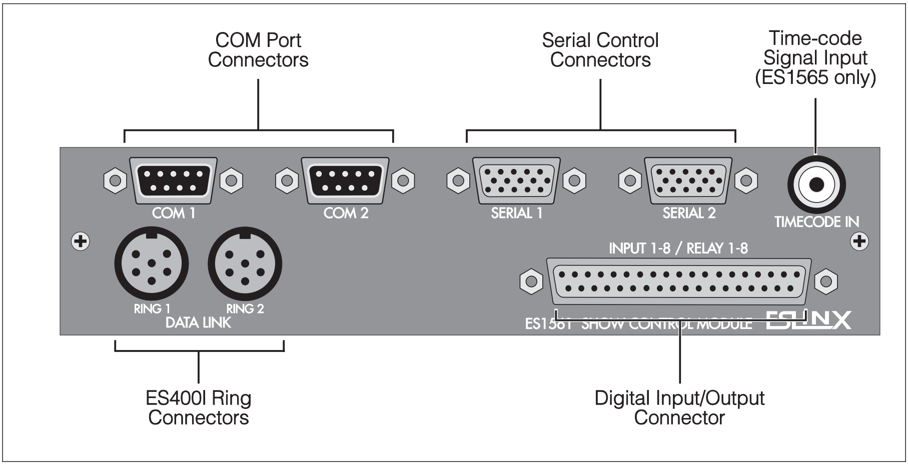
This appendix provides technical information on the ESLINX ES1561 Show Control Module.

ES1561 Show Control Module

Front Panel Features



Back Panel Connectors



General Description

The ES1561 Show Control Module incorporates a dedicated show computer which is capable of running shows produced by any of Electrosonic's application programs which use the ES4000 protocol (*e.g.* **Cthrough+*Plus***, **EASY+** and **BSC**). Two RS-232 'rings' are provided for the connection of additional ESLINX or ESTA II modules, or other ES4000-compatible devices

Two serial outputs are provided for the remote control of external equipment. Various serial drivers are included which are suitable for controlling a wide variety of equipment, such as Video Disc Players, Video / Audio Tape Players and CD Players (see Appendix E: Serial Drivers). In addition, the module offers eight internal relays which can be employed for any user-defined low-voltage application.

Physical Details (module only)

Overall Dimensions: 177.0mm (W) x 288.0mm (D) x 40.5mm (H)
Weight: 0.5kg.
Operating Conditions: Ambient temperature: 10 to 30C.
Ambient humidity (max): 80% non-condensing.

Power Requirements

The ES1561 is designed to be installed in (and powered by) an ES1520, ES1550 or ES1560 enclosure. A suitable cable assembly is provided with the enclosure for connecting the module to the power supply.

Supply Voltages: +5Vd.c. @ 1A;
+24Vd.c. @ 70 to 170mA; } *max. current depends*
– 12Vd.c. @ 10 to 110mA. } *on loading of* ±12V *lines*
Mating Connector : 6-pin (0.156" pitch) Molex® (5180 series).
Connection Detail: **1** +24V d.c.
2 +5V d.c. } *pins linked internally*
3 +5V d.c.
4 0V ground } *pins linked internally*
5 0V ground
6 –12V d.c.

Control Panel Overview

∧ & ∨ Buttons	Move up or down through menu, parameter and option lists.
MENU Button	Move to next menu.
ESCAPE Button	Move back one level in the menu hierachy. Repeated presses will return the display to the Player Status mode.
SELECT Button	Move to a sub-menu or parameter list. Also 'selects' a parameter from a list to enable a new option to be chosen.
STORE Button	Saves a new parameter option to the internal memory.

MENU LIST & SUB MENUS	PARAMETERS	OPTIONS
Player Status	*Shows last commands sent to Serial Ouputs.*	
Player Setup Player 1 - 2	**Driver Type:**	*Various.*
	Baud Rate:	1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200, Special.
	Data Bits:	8, 7, 6, 5.
	Parity:	None, Odd, Even.
	Communications Type:	RS-232, RS-422, RS-485, IR.
	Disk Type:	CAV, CLV.
	Video Standard:	PAL, NTSC.
Player Control Player 1 - 2		Index On, Index Off, PlayF, PlayR, Still, Ffwrd, Rewind, Plyr / Flt Rst.
Input Setup Input 1 - 8	**Show:**	None, SHOW*nn*, EFFECT*nn*.
	Def Seq:	None, *nn*.
	Polarity:	Normal, Reverse.
	Override:	None, Off, On.
Output Setup Output 1 - 8	**Override:**	None, Off, On.
Sequence Setup	*Allows viewing of internal sequence cues.*	

MENU LIST & SUB MENUS	PARAMETERS	OPTIONS
Parameter Setup	**Address:** **Start Delay:** **Baud:** **Players:** **Relays:** **Show/Efct:** **Language:**	01 *to* 24. None, 5s, 15s, 30s. 19200, 38400, 57600, 76800, 115200. 01–04 *to* 21–24 01–08 *to* 89–96 01–08 *to* 56–64 English, Symbols.
Diagnostic View	*Allows viewing of Error/Diagnostic codes with ∧ & ∨ buttons; press* **SELECT** *button to clear a code.*	
Manual Starts		Start Show *nn*, Start Effect *nn*, Start Sequence *nn*.

RING Indicators	Pulse ***green*** when a valid RS-232 command (ES4000 protocol) is being transmitted via **RING** connectors. **RING 1** indicator only pulses ***red*** when new set-up parameters are being saved to the internal memory. Remain *off* at all other times.
BUSY Indicator	Shows ***red/orange*** when data is being written to or read from the Memory Card – do not remove the card when lit. Shows ***green*** when the Memory Card is write-protected.

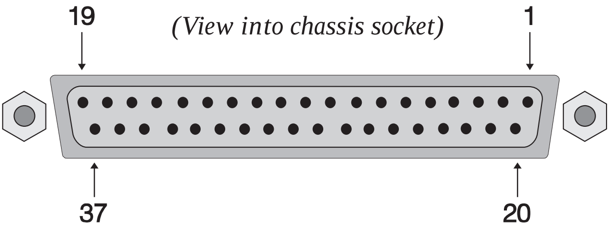
LCD Display

Type:	Liquid Crystal (with back lighting).
Back light colour:	Green.
Active Display Area:	approx. 55.5mm(W) x 10.5mm(H).
Display Format:	16 characters x 2 rows.

The LCD display is factory-set for optimum contrast. After a period of time, this may need to be adjusted slightly by fine-tuning a small preset resistor (accessible through the hole in the front panel). To adjust the contrast, use an insulated trimmer adjusting tool (not a metal screwdriver) to turn the preset.

Digital I/O Connector (INPUT 1-8 / RELAY 1-8)

This connector provides access to the eight switch-control inputs and also to the contacts of the eight internal relays. In addition, a 12V supply (internally limited to 100mA) and 0V connection are provided for use with the switch inputs; see the next page for an example of input usage.



Mating Connector: 37-pin D-type (male) with metal cover.

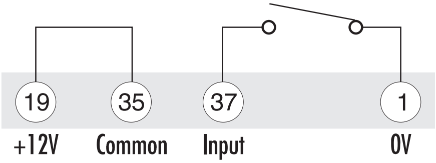
Pin-out Details:

1	Ground 0V.	**20**	Relay 8-NO.
2	Relay 8-NC.	**21**	Relay 8-Com.
3	Relay 7-NO.	**22**	Relay 7-NC.
4	Relay 7-Com.	**23**	Relay 6-NO.
5	Relay 6-NC.	**24**	Relay 6-Com.
6	Relay 5-NO.	**25**	Relay 5-NC.
7	Relay 5-Com.	**26**	Relay 4-NO.
8	Relay 4-NC.	**27**	Relay 4-Com.
9	Relay 3-NO.	**28**	Relay 3-NC.
10	Relay 3-Com.	**29**	Relay 2-NO.
11	Relay 2-NC.	**30**	Relay 2-Com.
12	Relay 1-NO.	**31**	Relay 1-NC.
13	Relay 1-Com.	**32**	SW7 & 8 Com.
14	SW8 Input.	**33**	SW7 Input.
15	SW5 & 6 Com.	**34**	SW6 Input.
16	SW5 Input.	**35**	SW1, 2, 3, 4 Com.
17	SW4 Input.	**36**	SW3 Input.
18	SW2 Input.	**37**	SW1 Input.
19	12V @ 100mA.	**Cover**	= Screen.

SWITCH-CONTROL INPUTS:

Input Type:	Opto-isolated (bi-directional).
Nominal Input Voltage:	+12V *(w.r.t. SW Com connection).*
Absolute Input Range:	± 5V to ± 24V.
Input Current:	15mA @ 12V *(limited by internal 680Ω resistor).*
Input Response (Polarity):	Active-low *(default)*; Active-high *(user set-up)*
Debounce Delay:	10 milliseconds (approx.).

Example method using SW1 input



NOTE *The opto-isolators are bi-directional to allow for common negative, common positive or a.c. systems.*

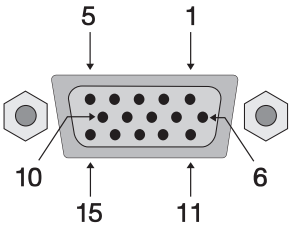
RELAY CONTACTS:

Contact Arrangement:	Single-pole changeover.
Contact Rating:	24V a.c. @ 0.2A; 50V d.c. @ 0.2A.

WARNING:
*These relay contacts are **not** safety isolated and are **not suitable for mains voltage operation.***

Serial Control Connectors (SERIAL 1 & 2)

These two connectors are functionally identical and are used to provide remote control of external devices such as Laser Disk Players or Video Tape Players, etc. Both outputs are configurable (via local set-up or ES4000 commands) to the appropriate device type with RS-232, RS-422, RS-485 or IR (Infra-red) standards.



(View into chassis socket)

Mating Connector: 15-pin ‘High Density’ D-type (male) with metal cover.

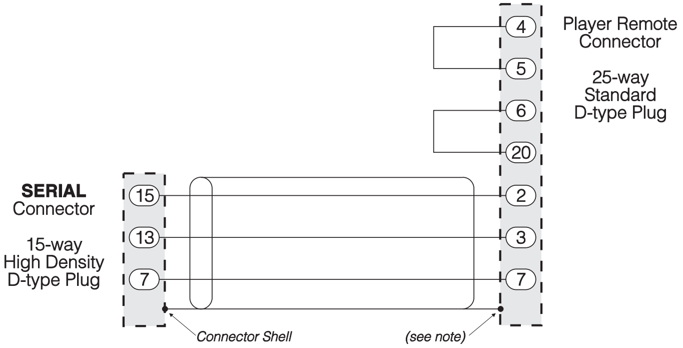
Pin-out Details:

1	RS-422 Tx B(–) *or* RS-485 B(–).	
2	RS-422 Tx A(+) *or* RS-485 A(+).	
3	IR Opto Emitter.	
4	RS-422 Rx B(–).	
5	RS-422 Rx A(+).	
6	Ground (0V)	*linked internally*
7	Ground (0V)	
8	*No connection.*	
9	+5V	*linked internally* – *must be externally limited to < 1A.*
10	+5V	
11	IR Opto Collector.	
12	IR Diode Drive (anode) – *use with 0V (cathode).*	
13	RS-232 Tx.	
14	*No connection.*	
15	RS-232 Rx.	

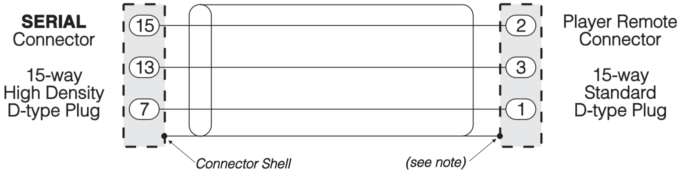
Cover = Screen.

Examples of Player Control Cables

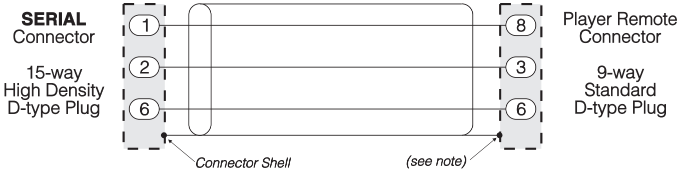
(a) RS-232 using Standard 25-way D-type Plug



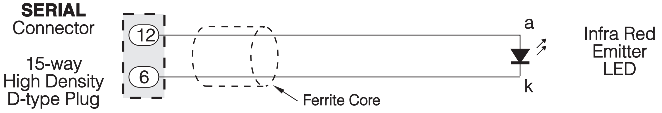
(b) RS-232 using Standard 15-way D-type Plug



(c) RS-422 using Standard 9-way D-type Plug



(d) IR (infra-red)

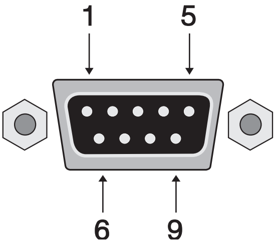


NOTE *Check player operating manual for cover type and screen connection.*

Serial Input Connectors (COM 1 & 2)

These connectors are used to link an external computer to the Show Control Module, for the purpose of show creation or editing. If the computer is fitted with an ES2005 or ES4325 Communications Card, connection is made to the card's (RING) outputs. If no card is fitted, the computer's serial (COM) ports are used.

When the ES1561 module is in 'Transparent Mode' (*i.e.* when the module is powered-up with no Memory Card) the **COM 1** and **COM 2** serial input connectors may be used to directly communicate with **RING 1** and **RING 2** respectively. This enables the system hardware to respond to the application program.



(View into chassis plug)

Mating Connector:	9-pin D-type (female) with metal cover.	
Pin-out Details:	**1**	Data Carrier Detect
	2	Receive Data
	3	Transmit Data
	4	Data Terminal Ready
	5	Signal Ground
	6	Data Set Ready
	7	Request to Send
	8	Clear to Send
	9	Ring Indicator
	Cover = Screen.	

Computer Serial Cables

Various cables are available to allow connection between a computer and the ES1561 Show Control Module during show programming. The cables required depend on whether you are using an ES2005/ES4325 communications card or the computer's serial ports (see diagram below).

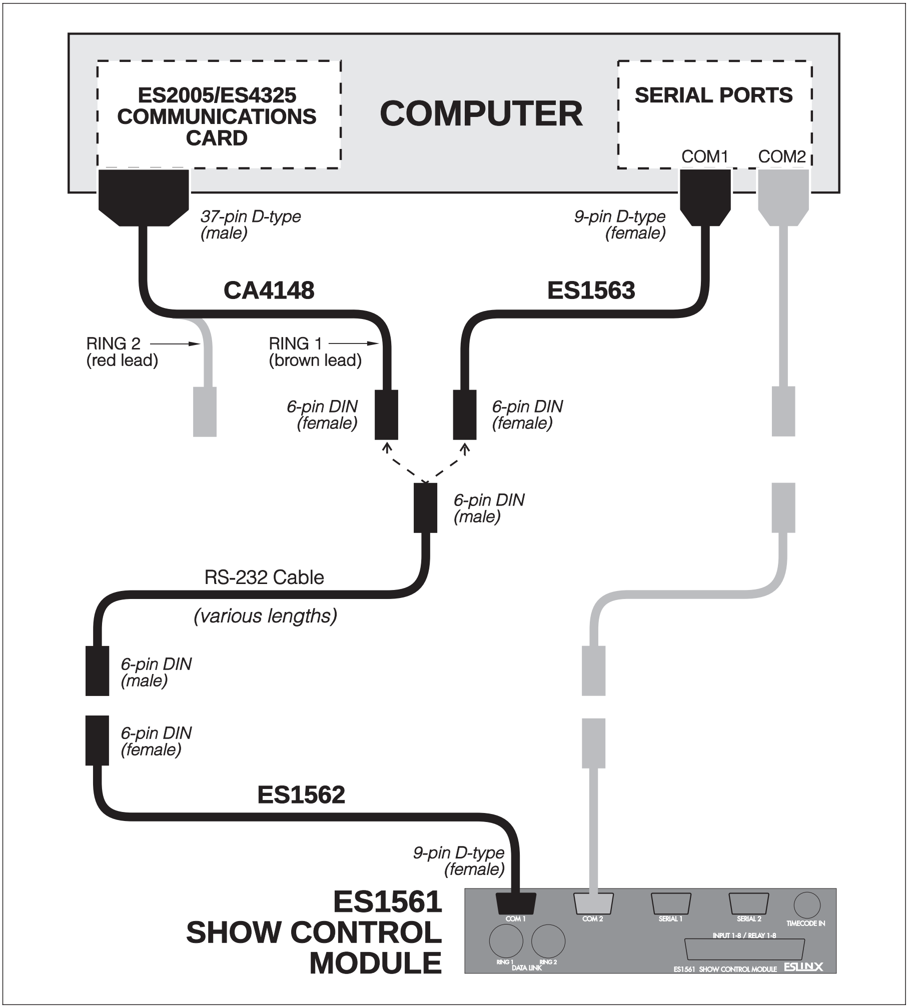
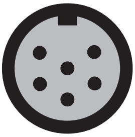


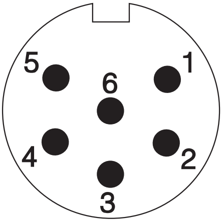
Fig.D-1: Cables and connections for computer link.

ES4000 Ring Connectors (RING 1 & RING 2)

These two connectors are used for RS-232 remote control applications using the Electrosonic ES4000 protocol. For details on ES4000 ring usage, please refer to Section 12.



(View into chassis socket)



Mating Connector: 6-pin DIN (male).

Pin-out Details:
- **1** RS-232 data in (bus master RX).
- **2** +12V supply *(limited to 100mA)*.
- **3** Link through.
- **4** –12V supply *(limited to 100mA)*.
- **5** RS-232 data out (bus master TX).
- **6** Ground (0V).
- **Casing** = Screen.

Recommended Cable: 6-core plus overall screen;
Capacitance must be <0.22mm^2 per core.

Max. Cable Length: 50m *(total length of ring)*.

Control Protocol (RS-232): Electrosonic ES4000 *(transmitted message types dependent on application program)*.

Max. Number of Nodes: 24 *(subject to application)*.

> ***IMPORTANT NOTE***
> *When the cable is to be used to connect between two modules mounted in an ES1560 Twin Module Case, a ferrite bead must be fitted near to the plug at both ends of the cable.*

Memory Card Interface

Interface Type: Flash Filing System.
Connector Type: PCMCIA / JEIDA 68-pin standard.
Max. Card Capacity: 64Mbyte.
Data Access: Read / Write.

Flash Memory Cards

Available Types: 2Mb *(Electrosonic part no. P160)*
4Mb *(Electrosonic part no. P161)*
10Mb *(Electrosonic part no. P162)*
20Mb *(Electrosonic part no. P163)*

Overall Dimensions: 86.0mm x 54.0mm x 3.1mm
Nominal Weight: 30g.
Operating Conditions: Ambient temperature: 0 to 65C.
Ambient humidity (max): 85% non-condensing.

Memory Type: Flash.
Memory Retention: >10 years (typicallly).

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Appendix E:
ES1553/61 Serial Drivers

Default Settings

The following table lists the serial drivers supplied (as standard) with **firmware version V1.2** of the ES1553 Serial Control and ES1561 Show Control Modules. Column 2 lists the player names associated with each driver; these are the options that appear within the Player Set-up menu. Columns 3 & 4 show the intitial settings used whenever that player is selected.

Driver Name/Version	**Player Name/Model**	**Initial Default Settings**	
		Baud Rate	**Communication Type**
Type 0 (Y/Z) V1.0	Y-Type Message Z-Type Message	9600 9600	RS-232 RS-232
Type 1 (Philips) V1.3	Generic Type 1 Philips 310 Philips 312 Philips 405 Philips 406 Philips 410 Philips 412	9600 9600 9600 9600 9600 9600 9600	RS-232 RS-232 RS-232 RS-232 RS-232 RS-232 RS-232
Type 2 (Sony) V1.3	Generic Type 2 Sony LDP1500 Sony LDP1550 Sony LDP1600 Sony LDP2000 Sony LDP3300 Sony LVA4500 Sony LVR6000 ESTA2	9600 9600 9600 9600 9600 9600 9600 9600 9600	RS-232 RS-232 RS-232 RS-232 RS-232 RS-232 RS-232 RS-232 RS-232

continued overleaf...

Driver Name/Version	**Player Name/Model**	**Initial Default Settings**	
		Baud Rate	**Communication Type**
Type 3 (Panasonic) V1.2	Generic Type 3 Panas. AG7330	9600 9600	RS-232 RS-232
Type 4 (Pioneer) V1.4	Generic Type 4 Pion. LDV2000 Pion. LDV4300 Pion. LDV8000 Pion. CLDV2300	4800 4800 4800 4800 4800	RS-232 RS-232 RS-232 RS-232 RS-232
Type 5 (Pioneer) V1.3	Generic Type 5 Pion. LDV6000	9600 9600	RS-232 RS-232
Type 6 (Panasonic) V1.2	Generic Type 6 Panas. TQ3032	9600 9600	RS-232 RS-232
Type 7 (Sony) V1.2	Generic Type 7 Sony 7030 Sony 9000	9600 9600 9600	RS-232 RS-232 RS-232
Type 8 (Sony) V1.2	Generic Type 8 Sony BVW-60 Sony BVW-65 Sony PVW-2800	38400 38400 38400 38400	RS-422 RS-422 RS-422 RS-422
Type 9 (Panasonic) V1.3	Generic Type 9 Panas. AG7150 Panas. AG7350	9600 9600 9600	RS-232 RS-232 RS-232
Type A (Sony) V1.2	Generic Type A Sony UVW1200 Sony UVW1400	9600 9600 9600	RS-232 RS-232 RS-232
Type U* (Sony) V1.1	Generic Type U Sony LDP IR	115200 115200	IR IR

** The ‘Type U’ driver is intended for testing purposes and only includes Play and Stop functions.*

Loading/Creating New Drivers (DRVPROG utility)

Both the ES1553 and ES1561 modules have the capacity to store up to 18 serial drivers. New drivers may be supplied by Electrosonic for special applications or as and when new players become available.

You can also create your own serial drivers. These are prepared as an ASCII text file using a conventional text editor (*e.g.* DOS 'EDIT'') and then downloaded into the ES1553 or ES1561 module's internal memory (via the **DATA LINK** ring) using the 'DRVPROG' software utility.

The DRVPROG utility is supplied on the ESLINX Utilities Disk (see Appendix H for further information).

IMPORTANT NOTE
To create Infra-Red drivers, you will need to use the ES1450 IR-Learn Module plus its associated software.

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Appendix F:
ES1561 Card Configuration

Various data files are used by the ES1561 module's show computer during its power-up (boot-up) routine. Some of these exist within the module's own Programmable Read Only Memory (PROM). These perform essential set-up tasks and can only be altered by changes to the module's firmware.

To allow the module's operation to be tailored to individual applications, two user set-up files together with various utility programs are installed on the Flash Memory Card using the SCMSETUP utility provided with ES1530 and ES1531. These can be altered using an ASCII text editor (*e.g.* DOS EDIT) and a PCMCIA card programmer. The Memory Card also contains the application program(s) and show file(s).

Fig.F-1 shows the location of the principle files and their order within the boot-up routine.

The remainder of this Appendix describes the precise function of each file and, where appropriate, gives guidance on customising.

It is assumed that the user has a reasonable knowledge of DOS functions. For further details, please refer to a DOS manual.

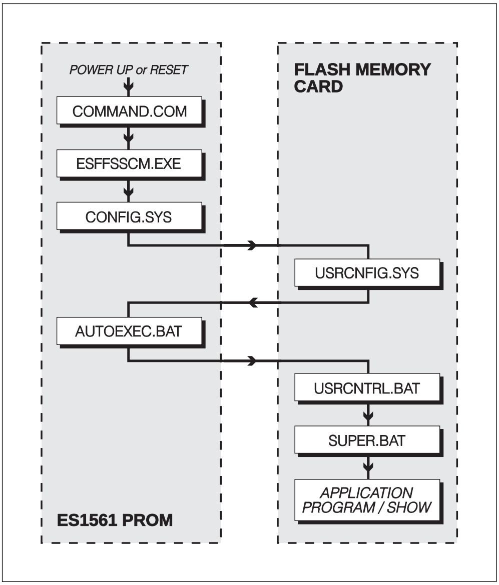

Fig.F-1: Running order & location of ES1561 files.

System Files (ES1561 PROM)

These files exist in the ES1561 PROM and can only be changed by installing new firmware.

COMMAND.COM

This sets-up the basic DOS command system.

ESFFSSCM.EXE

This is the software driver for the Flash Filing System used to read and write files from and to the Memory Card.

CONFIG.SYS

This is used to set-up any fixed parameters for the show computer's operating environment and comprises the following command lines:

```
switches=/f
lastdrive=f:
device=c:\esffsscm.exe
newfile=d:\usrcnfig.sys ;transfers set-up control to the
                         user-definable USRCNFIG.SYS file.
```

AUTOEXEC.BAT

This file is used by the operating system to run any fixed routines required by the ES1561 module and comprises the following command lines:

```
d:                            ;transfers DOS control to the d: drive
                              (i.e. the Flash Memory Card)
\utils\putlcd ES1561 SCM 1.10ES SCM FFS 2.10
                              ;allows firmware and flash filing version
                              to display on the LCD.  This is normally
                              inhibited by the initialisation routine of
                              the serial processor unit..
call usrcntrl.bat             ;transfers operating system control to the
                              user-definable USRCNTRL.BAT file
\utils\putlcd Warning? Exited the usrcntrl.bat
                              ;displays a warning message that the
                              USRCNTRL.BAT file has returned control
                              to the ES1561.  If this occurs, it indicates
                              that the USRCNTRL.BAT has terminated.
                              The module must be rebooted to regain
                              control.
```

User Files (memory card)

Card Directory Structure

The Flash Memory Card must be set-up with the required application software loaded. In addition, various control files and utility programs will be provided. The ES1561 module identifies the memory card as ’drive D:’:

- **D:\***(root directory)*

USRCNFIG.SYS	user-definable system configuration file
USRCNTRL.BAT	user-definable control batch file

- **D:\UTILS\***(utility programs directory)*

SUPER.BAT	‘supervisor’ batch file
SUPER.EXE	‘supervisor’ utility
BYEAPP.BAT	‘application terminated’ batch file
PUTLCD.EXE	LCD message display utility

- **D:\EASY200\** *or* **\CT331\** *or* \BSC3\\ *etc.*
  a directory named according to the application and containing the application program and show files.

USRCNFIG.SYS

This is used to set-up any variable or user-defined parameters for the show computer’s operating environment such as additional software drivers, etc. It comprises the following default command lines:

```
rem Electrosonic USRCNFIG.SYS v1.00
buffers=60
files=30
lastdrive=h:
```

USRCNTRL.BAT

This file is used by the operating system to run any user-definable routines or applications. This comprises the following default command lines:

```
echo off
rem Electrosonic USRCNTRL.BAT v1.10
set path=d:\utils               ;sets-up a default pathname for utilities.
d:                              ;ensures that d: drive is selected.

:loopy                          ;marks the start of a control loop.
call super.bat                  ;runs the supervisor batch file.
```

...there then follows various default Application Command Lines (see page 9-8 for further details)...

```
cd \                            ;selects d: drive root directory.
call byeapp.bat                 ;runs the 'application terminated'
                                  batch file.
goto :loopy                     ;go back to ':loopy' marker.
```

Application Command Line – Start-Up Flags

Function	**EASY+**	**CT+**	**BSC**
Disable mouse control	`-M`	`-M`	
Disable title page	`-n`	`-n`	
Disable bell / sound	`-b`	`-b`	
Toggle the AutoRun setting on or off	`-r`	`-r`	`-r`
Enable remote control on Ring (*When using CT+ x may be* 1 *or* 2)	`-a`	`-a`*x*	
Set unit number *x* (*should always be 0 with ESLINX*)	`-u`*x*	`-u`*x*	`-u`*x*
Enable MIDI timecode *(uses MPU401 and ‘BSCMIDI’ TSR)*	`-i2`		

Utility Programs

SUPER.BAT

A batch file used to run the Supervisor Utility (SUPER.EXE):

```
rem Electrosonic SUPER.BAT v1.00

rem super v1.42
rem ...check for TC card and route comms logic for TC
          card or COM seial ports
super

rem are we going to run the application?
putlcd Application is..!!! running !!!
```

SUPER.EXE

This program detects whether or not an ES1565 Timecode Card is fitted to the ES1561 and sets-up the internal serial communications routing accordingly.

BYEAPP.BAT

This batch file will be run only if the application program terminates or if is not executed (*e.g.* if the USRCNTRL.BAT file has not been set-up correctly).

It uses the PUTLCD.EXE utility to display a warning message on the LCD display:

```
rem Electrosonic BYEAPP.BAT v1.00
putlcd Application is..NOT running !!!
```

PUTLCD.EXE

Sends a user-defined text string as an ES4000 SU-type command to the ES1561 LCD display via the **DATA LINK RING 1**.

Up to 32 characters maximum can be displayed as two rows of 16 characters:

e.g.

```
PUTLCD This message is sent to the LCD
```

will give:

```
|This message is |
|sent to the LCD |
```

For more specialised control of message display, use SU-type commands – see page I-29 for details.

Appendix G:
ES1553/61 Diagnostics

DIA & ERR Codes

The following tables show various codes that may appear in Diagnostic View mode.

If a code appears within the Diagnostic (DIA) category, it is for advice only and will not affect the operation of the module. However, in some instances the unit or associated players may not respond as intended.

Certain advisory codes will always appear, even during normal usage; these codes are marked with an asterisk (*).

If a code appears within the Error (ERR) category, the correct operation of the unit may be impaired; the red **DATA** indicator will be fully lit to warn that something may be wrong. If this occurs, you are advised to reboot the module (turn-off the power, wait a few seconds, then turn back on).

If the error recurrs, or if an ERR code appears that is not listed, please contact your supplier or Electrosonic for further advice.

ES4000 COMMUNICATIONS		
Code	**Description**	**Likely Cause/Remedy**
210	Parse Gen	— Check for compatibility of controlling software (*e.g.* EASY, BSC, *etc.*)
213*	Unimp Type	— Unused command type received.
214	Unexpected Type	— Unknown command type received.
220	Tx Lost	— Unable to transmit.
221*	Tx Time Out	— Failed to transmit in allotted time.
230	Rx Lost	— The module has failed to interpret or execute an incoming command.
231 232 233	Rx ERO Rx ERF Rx ERP	Corrupted data caused by spurious noise or RF interference; check cable integrity / length and connections.
234 235 236	Invalid Type No CTRL C Gen Fail 1	Check for compatibility of controlling software (*e.g.* EASY, BSC, *etc.*)
237*	Rx Time Out	— No commands received for 10 secs.
240	Unexpected S Type	— An unrecognised sub-format of S-type command has been received.

* *These advisory codes will often appear (even during normal usage) and can generally be ignored.*

MODULE HARDWARE/PROCESSING		
Code	**Description**	**Likely Cause/Remedy**
053 055	Unexpected event Ignored event	— Reboot the module. — Reboot the module.
620* 621* 622* 623* 624* 625* 626* 627* 628*	PBlck0 Invalid PBlck1 Invalid PBlck Check Fail PBlck ReProg Start PBlck ReProg Fail PBlck ReProg S Fail PBlck ReProg P Fail PBlck ReProg E Fail PBlck ReProg ENYET	Caused by changes to internal data storage blocks, e.g. by changing the module's set-up parameters.
642 643	SP Checksum SP Address Low	An error has occured whilst attempting to down-load new firmware. Repeat down-load operation ***without*** turning the module off.
690* 691*	Prog Req Erase Req	These will always occur during firmware down-load operations.

** These advisory codes will often appear (even during normal usage) and can generally be ignored.*

SERIAL DRIVER/OUTPUT		
Code	**Description**	**Likely Cause/Remedy**
710	InvBaudReq	Problem with serial driver(s); either they are corrupted or parameters are out of range. May occur as a result of a bad down-load of new drivers; try down-loading again.
711	InvMediumReq	
712	InvStopBitsReq	
713	InvParityReq	
714	InvStickParityReq	
715	InvDataBitsReq	
716	InvPlayerType	
717	InvDealerReq	
718	InvPlayerNameReq	
719	InvDealerType	
720	PlayerCmdLost	— A requested command wasn't sent.
721	CmdSentToDisPlayer	— A command has been sent to a player which has reported an internal error.
732	PlayerSetToInvType	— Check that driver is correct for player.
733*	RxUnsolicited	— Unexpected message from player.
734	RxSpecialTwice	— May occur with certain players.
740	SlowTxFin	— May occur with certain players.
742*	RxDuringWCDelay	— May occur with certain players.
751	TxHaltTimeout	— May occur with certain players.
752	SearchTimeout	— A player did not complete a search within the specified time-out period.
781	UartErrInt	— Check for correct baud rate, etc.
782	UartErrInt0	— Check for correct baud rate, etc.
783	UartErrIntData	— Check for correct baud rate, etc.
784	PlayerReturnErr	— A player has reported an error condition (*e.g.* no laserdisk present).

* *These advisory codes will often appear (even during normal usage) and can generally be ignored.*

INTERNAL SEQUENCES		
Code	**Description**	**Likely Cause/Remedy**
810 811 812 813	InvShowStartReq InvShowStopReq InvShowDirReq InvGXLAPlyReq	An R-type command has requested an internal sequence that is out of range (*i.e.* not 1 to 17).
820	CantAddMessage	— An attempt to add a cue has failed.
830	NoMoreMessFree	— All of the available cues are in use.
842	MessReqTooLong	— An attempt has been made to add a cue that is longer than permitted.
843	MessWhereInv	— A sequence ‘chain’ is invalid.
844	MessAddReqFail	— An attempt to add a cue has failed.

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Appendix H:
ESLINX Utilities Disk

The ESLINX Utilities Disk is a 3.5 inch floppy disk which contains the following software utilities for use with the ESLINX System:

- Four Disk Controller PC Software,
- Serial Driver Programming Utility.
- Firmware Download Utility,

This disk is supplied with the following products:

ES1530	Flash Card Read / Write Interface Kit
ES1531	PCMCIA Flash Filing System
ES4324	EASY+ Multi-Image Programming System.

Installing the Utilities Disk

The utilities disk includes a README.TXT file which you are advised to read (using DOS 'TYPE' or 'EDIT' functions, for example).

This file gives instructions on installing the disk to your computer's hard disk drive and will include any additional information which was not available when this User Guide went to print.

The various utility programs, data files and help files will be installed in a directory called ESLINX with three sub-directories called 4DISC, DRIVERS and FIRMWARE.

Four Disk Controller (FDC)

This utility is used to program internal sequences on an ES1553 Serial Control Module or an ES1561 Show Control Module.

Directory:	`C:\ESLINX\4DISC`
Program:	`4DISC.EXE`
Help File:	`4DISCWW2.DOC` Full instructions for preparing Script files and downloading new sequences. This help file is in **Word for Windows™ version 2** format.

Serial Driver Programming Utility

This utility is used to create and download new serial drivers for an ES1553 Serial Control Module or an ES1561 Show Control Module. Copies of the current serial driver data files are also included in this directory.

Directory:	`C:\ESLINX\DRIVERS`
Program:	`DRVPROG.EXE`

Help Files:	`DRIVER.TXT`
	This describes the content and format of driver data files.
	`PROGDRVR.TXT`
	This describes the process of downloading new driver data files.

Firmware Download Utility

This utility allows updated Serial Processor firmware to be downloaded into an ES1553 Serial Control Module or an ES1561 Show Control Module. A copy of the current firmware data file for the Serial Processor (`SPMAIN.BIN`) is also included in this directory.

Directory:	`C:\ESLINX\FIRMWARE`
Program:	`AVDUMP.EXE`
Help Files:	`1553FW.TXT` This describes how to download a new firmware data file.

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Appendix I:
ES4000 Protocol

This Appendix provides details on the format of the various ES4000 commands used by modules within the ESLINX system.

Many of these are capable of being generated automatically by cues in one of Electrosonic's application programs (*e.g.* **Cthrough+*Plus***, **EASY+**, **BSC**):

The transmittable comment/remark cues available in these applications can be used to create specialised commands. The ESLINX system also makes use of some special format commands which currently cannot be generated any other way.

Description of the Command Format

Throughout this appendix the basic structure of each ES4000 command is shown in the following way (e.g. D-type):

SOH^{1}	Type^{2}	Header$^{3-5}$	STX^{6}	Command Block^{7-30*}	ETB^{31*}	ETX^{32*}
^A	**D**	*n1 n2 n3*	**^B**	*r1 r2 r3 ..... r24*	**^W**	**^C**
01	44		02		17	03

The **top row** identifies the key data ‘blocks’ within the command string. The following ASCII abbreviations are used:

SOH = Start of Header
STX = Start of Text
ETB = End of Transmission Block
ETX = End of Text

The superscript number following the block title (*e.g.* Type^{2}) denotes the position of that byte relative to the start of the string. Where more than one byte is used, the values indicate the first and last byte position (*e.g.* Header$^{3-5}$). If the command is of a variable length, the maximum value for each byte position will be shown — the asterisk * denotes that the value can be less than indicated. If the exact position of a byte (or position range) cannot easily be pre-determined, this will be indicated by question marks (*e.g.* Command Block $^{7-??}$).

The **middle row** shows the ASCII character(s) used by each block, whilst the **bottom row** shows the equivilent Hexadecimal values.

NOTE *A cross-reference table of ASCII, Hexadecimal and Binary values appears at the end of this appendix (page I-34).*

Characters which are shown in italics (*e.g.* ***n1 n2 n3***) denote user-defined values which are explained in the accompanying text.

Fixed/Variable Length Commands

Certain types of ES4000 command (*e.g.* H-type) are ‘position dependent’, *i.e.* the position of data is mapped to specific devices relative to the start of the command string.

Many Electrosonic products now permit any unused / uncontrolled devices to be omitted after the last data instruction in these commands.

All modules in the ESLINX and ESTA II ranges support these ‘variable length’ commands. However, certain older products may not. If in doubt, use only fixed length commands.

Examples

Various examples are included for each command. For clarity these are shown with spaces between each element of the command string. **THESE SPACES MUST NOT BE INCLUDED IN NORMAL USAGE!**

D-type (standard)

Function Control of up to 96 relays in 4-relay blocks only. If true individual operation is required, use extended D-type.

Generated by Cthrough+*Plus*, EASY+, BSC.

Format

SOH[1]	Type[2]	Header[3-5]	STX[6]	Command Block[7-30*]	ETB[31*]	ETX[32*]
^A	**D**	*n1 n2 n3*	**^B**	*r1 r2 r3* *r24*	**^W**	**^C**
01	44		02		17	03

Header For all ES1553 and ES1561 applications, the three bytes (*n1*, *n2*, *n3*) are ignored but must be present; it is suggested that they are all given the value 30 hex (‘0’ character in ASCII).

Command Block Between 1 and 24 single byte values with each byte representing the status of 4 relays. Each byte is position dependent relative to the start of the Command Block:

r1 = relays 1–4
r2 = relays 5–8
r24 = relays 93–96.

Any unused / uncontrolled relays must have the Null command ‘/’ in the relevant position(s). Any Null bytes after the last *controlled* player may be omitted.

Each byte is used to turn on or off its associated four relays as show in the following table:

ASCII	**HEX**	**Relays**				**ASCII**	**HEX**	**Relays**				**ASCII**	**HEX**	**Relays**			
		A	*B*	*C*	*D*			*A*	*B*	*C*	*D*			*A*	*B*	*C*	*D*
/	2F	*null - no change*				**5**	35	1	0	1	0	**;**	3B	1	1	0	1
0	30	0	0	0	0	**6**	36	0	1	1	0	**<**	3C	0	0	1	1
1	31	1	0	0	0	**7**	37	1	1	1	0	**=**	3D	1	0	1	1
2	32	0	1	0	0	**8**	38	0	0	0	1	**>**	3E	0	1	1	1
3	33	1	1	0	0	**9**	39	1	0	0	1	**?**	3F	1	1	1	1
4	34	0	0	1	0	**:**	3A	0	1	0	1	**0 = Off 1 = On**					

EXAMPLES:

Turn Relays 1 & 2 ON and Relays 3 & 4 OFF:

```
^A D 000 ^B 3 ^W ^C
```

Turn Relay 8 ON and Relays 5, 6 & 7 OFF, without changing the state of Relays 1 to 4:

```
^A D 000 ^B / 8 ^W ^C
```

Turn all Relays OFF:

```
^A D 000 ^B 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ^W ^C
```

D-type (extended)

Function A variation of the standard D-type command which uses an Enable Block between the ^W and ^C characters. This is used to enable the operation of specific relays allowing true independent control of all 96 relays.

Generated by Transmittable Comments only.

Format

SOH^{1}	Type^{2}	Header$^{3-5}$	STX^{6}	
^A	**D**	*n1 n2 n3*	**^B**	
01	44		02	

	Command Block^{7-30*}	ETB^{31*}	Enable Block^{32-55*}	ETX^{56*}
	r1 r2 r3 ..... r24	**^W**	*e1 e2 e3 ..... e24*	**^C**
		17		03

Command Block This is used to define the on / off status of relays in the same manner as for the standard D-type command.

Enable Block Between 1 and 24 single byte values used to specify which relays are to be affected by the on / off status defined in the Command Block, and which are to remain unchanged. Each byte is position dependent relative to the start of the Enable Block and ‘enables’ a block of 4 relays:

e1 = relays 1–4
e2 = relays 5–8
e24 = relays 93–96.

Any unused / uncontrolled relays must have the Null command ‘/’ in the relevant position(s). Any Null bytes after the last *controlled* player may be omitted.

Each byte is used to turn on or off its associated four relays as show in the following table:

ASCII	**HEX**	**Relays**				**ASCII**	**HEX**	**Relays**				**ASCII**	**HEX**	**Relays**			
		A	*B*	*C*	*D*			*A*	*B*	*C*	*D*			*A*	*B*	*C*	*D*
						5	35	1	0	1	0	**;**	3B	1	1	0	1
0	30	0	0	0	0	**6**	36	0	1	1	0	**<**	3C	0	0	1	1
1	31	1	0	0	0	**7**	37	1	1	1	0	**=**	3D	1	0	1	1
2	32	0	1	0	0	**8**	38	0	0	0	1	**>**	3E	0	1	1	1
3	33	1	1	0	0	**9**	39	1	0	0	1	**?**	3F	1	1	1	1
4	34	0	0	1	0	**:**	3A	0	1	0	1	**0 = ignore 1 = change**					

EXAMPLES:

Turn Relays 1 & 2 ON, leaving Relays 3 & 4 unchanged:

```
^A D 000 ^B 3 ^W 3 ^C
```

Turn Relay 8 ON, leaving Relays 1 to 7 unchanged:

```
^A D 000 ^B / 8 ^W 0 8 ^C
```

d-type

Function A variation of the extended D-type for use by internal sequences on the ES1553 or ES1561 modules, with only the first two command positions (*i.e.* eight relays) being decoded to control the eight relays within the module.

Generated by Four Disk Controller (FDC) software utility.

Format

SOH[1]	Type[2]	Header[3-5]	STX[6]	Command Block[7-14*]	ETB[15*]	Enable Block[16-23*]	ETX[24*]
^A	**d**	*n1 n2 n3*	**^B**	*r1 r2*	**^W**	*e1 e2*	**^C**
01	64		02		17		03

Command Block This is used to define the on / off status of relays in the same manner as for the standard D-type command.

1 or 2 single byte values with each byte representing the on / off status of 4 relays. Each byte is position dependent relative to the start of the Command Block:

r1 = relays 1–4
r2 = relays 5–8

If relays 5-8 aren't used, byte *r2* may be omitted.

Enable Block 1 or 2 single byte values used to specify which relays are to be affected by the on / off status defined in the Command Block, and which are to remain unchanged. Each byte is position-dependent relative to the start of the Enable Block and 'enables' a block of 4 relays. :

e1 = relays 1–4
e2 = relays 5–8

If relays 5-8 aren't used, byte *e2* may be omitted.

F-type

Function Level setting and fade control of up to 320 analogue channels. The actual number of available channels is dependent upon the application program.

Generated by EASY+.

Format

SOH^{1}	Type^{2}	Header$^{3\text{-}5}$	STX^{6}	Bank^{7}	Command Block$^{8\text{-}40*}$	ETB^{41*}	ETX^{42*}
^A	**F**	*n1 n2 n3*	**^B**	*b*	*c1 c2 c3 ..... c32*	**^W**	**^C**
01	46		02			17	03

Header The three bytes (*n1*, *n2*, *n3*) represent a numeric value which is interpreted as a fade time or stop fade level depending on the contents of the Command Block.

Where used, each byte is given an ASCII value of ‘0’ to ‘9’ (30 to 39Hex), *e.g.* a value of 250 is represented as:

n1 = 2 (32Hex) *n2* = 5 (35Hex) *n3* = 0 (30Hex).

For values less than 100, a leading zero(s) must be included, *e.g.* a value of 25 must be formatted as 025.

Fade rates are interpreted in ‘tenths of seconds’ and may lie between 000 (zero) and 999 (99.9 seconds).

Levels are interpreted proportionally between the following limits: 000 (full down) and 990 (full up).

Bank A single byte with an ASCII value of ‘0’ to ‘9’ (30 to 39Hex) defining which of 10 possible banks of 32 channels the Command Block is to be applied to.

Command Block Between 1 and 32 single-byte values with each byte representing a command for one channel (see table below). Each byte is position-dependent relative to the start of the Command Block:

c1 = channel 1
c2 = channel 2
c32 = channel 32.

Any unused channels beyond the last controlled channel may have their corresponding ‘null’ byte omitted.

ASCII	Hex	Description
/	2F	NULL - do nothing.
0	30	NULL - do nothing (*2F Hex is preferred*).
1	31	Fade down at rate in Header.
2	32	Fade up at rate in Header.
3	33	Set channel directly to level in Header.
8	38	Set ‘stop fade’ to level in Header.
9	39	Abort present fade.

Note: *A header value may be used as both a fade rate and a level by different channels within the same F-type.*

EXAMPLES:

Set the stop fade level of channel 1 (bank 0, channel 1) to 85%:

```
^A F 850 ^B 0 8 ^W ^C
```

Fade up channel 1 (to stop fade level) in 4 seconds:

```
^A F 040 ^B 0 2 ^W ^C
```

Abort the present fade (if any) on Channel 35 (bank 1, channel 3):

```
^A F 000 ^B 1 / / 9 ^W ^C
```

G-type

Function Level setting and fade control of up to 320 analogue channels. The actual number of available channels is dependent upon the application program.

Generated by EASY+, Ancor.

Format

SOH^{1}	Type^{2}	Header$^{3-5}$	STX^{6}	Data Block^{7-39*}	Bank^{40*}	ETB^{41*}	ETX^{42*}
^A	**G**	*n1 n2 n3*	**^B**	*c1 c2 c3 .... c32*	*b*	**^W**	**^C**
01	47		02			17	03

Header The three bytes (*n1*, *n2*, *n3*) represent a numeric value from 000 to 999 which is interpreted as a fade time for the channels being set in the Data Block.

Each byte is given an ASCII value of ‘0’ to ‘9’ (30 to 39Hex), *e.g.* a value of 250 is represented as:

n1 = 2 (32Hex) *n2* = 5 (35Hex) *n3* = 0 (30Hex).

For values less than 100, a leading zero(s) must be included, *e.g.* a value of 25 must be formatted as 025.

Fade rates are interpreted either in ‘seconds’ or ‘tenths of seconds’ depending on the setting of bit 7 of the Bank byte as follows:

when bit 7 = 0: value is in tenths of seconds;
when bit 7 = 1: value is in whole seconds.

Data Block Between 1 and 32 single-byte values with each byte representing a level for one channel. Each byte is position-dependent relative to the start of the Data Block:

c1 = channel 1
c2 = channel 2
c32 = channel 32.

Any unused channels beyond the last controlled channel may have their corresponding byte omitted.

Each byte must have a hexadecimal value (*i.e.* 00 to FF Hex; 0 to 255 decimal). The following table lists the values for a few 'spot' voltages:

Hex Value	**ES1552 Voltage**	**Hex Value**	**ES1552 Voltage**	**Hex Value**	**ES1552 Voltage**
00	*no change*	06	0.00 *(zero)*	99	5.99
01	0.03	1A	1.01	B3	7.01
02	0.07	34	1.99	CC	7.99
03	0.11	4D	3.01	E6	9.01
04	0.15	66	3.99	FF	9.99
05	0.19	80	5.01		

Bank A single byte that defines which of 10 possible banks of 32 channels the Data Block is to be applied to, and to identify the fade rate resolution of the Header.

For fade resolution in tenths of seconds (bit 7 = 0):
use values 30 to 39 Hex (ASCII values '0' to '9').

For fade resolution in whole seconds (bit 7 = 1):
use values B0 to B9 Hex (no ASCII equivalents).

EXAMPLES:

In the following examples, note the use of the prefix **^&** to denote a Hex value. This feature is only supported by **EASY+** and **Cthrough+*Plus***.

Set channels 1 and 2 (bank 0) directly to 5.01V (*i.e.* 80 Hex):

```
^A G 000 ^B ^&80 ^&80 0 ^W ^C
```

Set channel 34 (bank1, chan.2) to 9.99V (*i.e.* FF Hex) with 8 second fade:

```
^A G 080 ^B ^&00 ^&FF 1 ^W ^C
```

Set channel 35 to 7.01V (*i.e.* B3 Hex) with 120 second fade; note that bit 7 of the bank byte is set (*i.e.* B1 Hex):

```
^A G 120 ^B ^&00 ^&00 ^&B3 ^&B1 ^W ^C
```

g-type

Function Programming of internal ‘scenes’ for the ES1552 module.

Generated by EASY+.

Format

SOH[1]	Type[2]	Header[3-5]	Priority	Scene	STX[6]	
^A	**g**	*n1 n2 n3*	*p1 p2*	*s1 s2*	**^B**	
01	67				02	

	Data Block[7-38*]	Bank[39*]	ETB[40*]	ETX[41*]
	c1 c2 .... c32	*b*	**^W**	**^C**
			17	03

Header The three bytes (*n1*, *n2*, *n3*) represent a numeric value from 000 to 999 which is interpreted as a fade time for the specified scene.

Each byte is given an ASCII value of ‘0’ to ‘9’ (30 to 39Hex), *e.g.* a value of 250 is represented as:

n1 = 2 (32Hex) *n2* = 5 (35Hex) *n3* = 0 (30Hex).

For values less than 100, a leading zero(s) must be included, *e.g.* a value of 25 must be formatted as 025.

Fade rates are interpreted either in ‘seconds’ or ‘tenths of seconds’ depending on the setting of bit 7 of the Bank byte as follows:

when bit 7 = 0:	value is in tenths of seconds;
when bit 7 = 1:	value is in whole seconds.

Priority Two ASCII digits ‘0’ to ‘9’ (30 to 39 Hex) to denote the priority of the scene – this feature is not currently implemented on the ES1552 module and should be set to ‘00’.

Scene	Two ASCII digits ‘0’ to ‘9’ (30 to 39 Hex) representing the scene number to be programmed.
Data Block	Between 1 and 32 single-byte values with each byte representing a level for one channel. Each byte is position-dependent relative to the start of the Data Block: *c1* = channel 1 *c2* = channel 2 *c32* = channel 32. Any unused channels beyond the last controlled channel may have their corresponding byte omitted. Each byte must have a hexadecimal value (*i.e.* 00 to FF Hex; 0 to 255 decimal). See G-type for further details.
Bank	A single byte that defines which of 10 possible banks of 32 channels the Data Block is to be applied to, and to identify the fade rate resolution of the Header. *For fade resolution in tenths of seconds (bit 7 = 0):* use values 30 to 39 Hex (ASCII values ‘0’ to ‘9’). *For fade resolution in whole seconds (bit 7 = 1):* use values B0 to B9 Hex (no ASCII equivalents).

EXAMPLES:

In the following examples, note the use of the prefix **^&** to denote a Hex value. This feature is only supported by **EASY+** and **Cthrough+*Plus***.

Set channels 1 to 5 in scene 3 to 50% (80 Hex) with a fade time of 8.5 seconds:

```
^A g 085 00 03 ^B ^&80 ^&80 ^&80 ^&80 ^&80 0 ^W ^C
```

Set scene 12 fade time only to 200 seconds (channel levels are not affected); note that bit 7 of the bank byte is set (*i.e.* B1 Hex):

```
^A G 200 00 12 ^B ^&B1 ^W ^C
```

H-type

Function Control and set-up of video and audio tape / disc players.

Generated by Cthrough+*Plus*, EASY+.

Format

SOH^{1}	Type^{2}	Header$^{3\text{-}12*}$	STX^{13*}	Command Block$^{14\text{-}61*}$	ETB^{62*}	ETX^{63*}
^A	**H**	*(see text)*	**^B**	*c1d1 c2d2 ..... c24d24*	**^W**	**^C**
01	48		02		17	03

Header One or two numbers represented by ASCII digits 0 to 9 (30 to 39 Hex). This can be in one of four formats:

NNNNN MMMMM	*two 5-digit numbers*
NNNNNN	*one 6-digit number*
NNNNNNN	*one 7-digit number*
NNNNNNNN	*one 8-digit number*

Refer to the Command Block list for usage – where used, the numeric value(s) must comprise the exact number of digits specified above by including leading zeros if necessary, *e.g.* a value of 123 must be represented as 000123 in the 6-digit format. Where not used, the Header block is ignored and can be omitted.

Command Block Between 1 and 24 two-byte values with each pair representing a command for one player (see table opposite and on subsequent pages). Each byte-pair is position-dependent relative to the start of the Command Block:

c1d1 = player 1
c2d2 = player 2
c24d24 = player 24.

Any unused / uncontrolled players must have the Null command 00 in the relevant position(s). Any Null byte-pairs after the last *controlled* player may be omitted.

Command Pair		**Function**
ASCII	**Hex**	
00	30 30	Null – no change
20	32 30	Set Player / Serial Driver Type 0
21	32 31	Set Player / Serial Driver Type 1
22	32 32	Set Player / Serial Driver Type 2
23	32 33	Set Player / Serial Driver Type 3
24	32 34	Set Player / Serial Driver Type 4
25	32 35	Set Player / Serial Driver Type 5
26	32 36	Set Player / Serial Driver Type 6
27	32 37	Set Player / Serial Driver Type 7
28	32 38	Set Player / Serial Driver Type 8
29	32 39	Set Player / Serial Driver Type 9
2A	32 41	Set Player / Serial Driver Type A
2B	32 42	*Reserved Type B*
2C	32 43	*Reserved Type C*
2D	32 44	*Reserved Type D*
2E	32 45	*Reserved Type E*
2F	32 46	*Reserved Type F*
50	35 30	*Reserved Type G*
51	35 31	*Reserved Type H*
52	35 32	*Reserved Type I*
53	35 33	*Reserved Type J*
54	35 34	*Reserved Type K*
55	35 35	*Reserved Type L*
56	35 36	*Reserved Type M*
57	35 37	*Reserved Type N*
58	35 38	*Reserved Type O*
59	35 39	*Reserved Type P*
5A	35 3A	*Reserved Type Q*
5B	35 3B	*Reserved Type R*
5C	35 3C	*Reserved Type S*
5D	35 3D	*Reserved Type T*
5E	35 45	Set Player / Serial Driver Type U

Command Pair		**Function**
ASCII	**Hex**	
31	33 31	Set Baud Rate to *NNNNN*
32	33 32	Set Data Bits, where *NNNNN* is: 00000 = 5 Data Bits 00001 = 6 Data Bits 00002 = 7 Data Bits 00003 = 8 Data Bits (default)
34	33 34	Set Parity, where *NNNNN* is: 00000 = No Parity (default) 00001 = Odd Parity 00002 = Even Parity
36	33 36	Set Media Type, where *NNNNN* is: 00001 = RS-232 00002 = RS-422 00003 = RS-485 (DMX) 00004 = Infra-Red (IR)
37	33 37	Set Disc Type, where *NNNNN* is: 00001 = CAV 00002 = CLV
38	33 38	Set Video Type, where *NNNNN* is: 00001 = PAL 00002 = NTSC
43	34 33	Disable Show Start
44	34 34	Enable Show Start
49	34 39	Disable last Show Start

Command Pair		**Function**
ASCII	**Hex**	
60	36 39	Infra-Red number, digit ‘0’
61	36 31	Infra-Red number, digit ‘1’
62	36 32	Infra-Red number, digit ‘2’
63	36 33	Infra-Red number, digit ‘3’
64	36 34	Infra-Red number, digit ‘4’
65	36 35	Infra-Red number, digit ‘5’
66	36 36	Infra-Red number, digit ‘6’
67	36 37	Infra-Red number, digit ‘7’
68	36 38	Infra-Red number, digit ‘8’
69	36 39	Infra-Red number, digit ‘9’
81	38 31	Internal Audio Source
82	38 32	External Audio Source
83	38 33	Audio On (both channels)
84	38 34	Audio Off (both channels)
85	38 35	CX On
86	38 36	CX Off
87	38 37	Audio Chan 1 On
88	38 38	Audio Chan 1 Off
89	38 39	Audio Chan 2 On
8A	38 41	Audio Chan 2 Off
8B	38 42	Internal Audio Source Channel 1
8C	38 43	External Audio Source Channel 1
8D	38 44	Internal Audio Source Channel 2
8E	38 45	External Audio Source Channel 2

Command Pair		**Function**
ASCII	**Hex**	
91	39 31	Chapter Display On (CAV Disks)
92	39 32	Chapter Display Off (CAV Disks)
93	39 33	Frame Number Display On
94	39 34	Frame Number Display Off
A1	41 31	Clear (Cl)
A2	41 32	Load Autostop with Frame *NNNNN* and play
A3*	41 33	Set Speed to *NNNNN*
A4*	41 34	Load Entry Register with *NNNNN*
A5	41 35	Clear Entry
A6*	41 36	Set Slow Speed to *NNNNN*
A7*	41 37	Set Fast Speed to *NNNNN*
A8*	41 38	Multispeed Forward to *NNNNN*
A9*	41 39	Multispeed Reverse to *NNNNN*
B1	42 31	Motor On (use B5)
B2	42 32	Motor Off
B3	42 33	Eject Disc
B4	42 34	Do Not Eject Disc
B5	42 35	Load (==standby to active)
B6	42 36	Fast Forward
B7	42 37	Rewind

NOTE: *Commands marked with '*' are not relevant to Infra-Red Drivers.*

Command Pair		**Function**
ASCII	**Hex**	
C1	43 31	Autostop
C2	43 32	Continue
C3	43 33	Key Release
C4	43 34	Multispeed
C5	43 35	Pause
C6	43 36	Play Forward Normal
C7	43 37	Play Forward Fast
C8	43 38	Play Forward Slow
C9	43 39	Play Reverse Normal
CA	43 41	Play Reverse Fast
CB	43 42	Play Reverse Slow
CC	43 43	Scan / Shuttle Forward
CD	43 44	Scan / Shuttle Reverse
CE	43 45	Search for Frame *NNNNN* and Still
D1	44 31	Still / Step Forward
D2	44 32	Still / Step Reverse
D3	44 33	Stop with Video Off
D4	44 34	Pause, Freeze / Still with Video On
D5*	44 35	Repeat *NNNNN* times
D6	44 36	Repeat Loop (Not VP406 / VP410)
D7	44 37	Repeat (Not VP406 / VP410)
D8*	44 38	Set Repeat Number to *NNNNN*
D9*	44 39	Play to *NNNNN*

NOTE: *Commands marked with '*' are not relevant to Infra-Red Drivers.*

Command Pair		**Function**
ASCII	**Hex**	
E1	45 31	Internal Video Source
E2	45 32	External Video Source
E3	45 33	Video On
E4	45 34	Video Off
E5	45 35	Chapter Mode On
E6	45 36	Frame Mode On
F1*	46 31	Audio Control *NNNNN*
F2*	46 32	Digital Control (sub audio) *NNNNN*
F8	46 38	Play to *NNNNN* *Both commands must be sent – 'F8' first.*
F9	46 39	
FA	46 41	Pause and Stop

NOTE: *Commands marked with '*' are not relevant to Infra-Red Drivers.*

EXAMPLES:

Request player 1 to search to frame number 12345:

```
^A H 12345 ^B CE ^W ^C
```

Start player 3 in 'normal play forward' and pause player 4:

```
^A H ^B 00 00 C6 C5 ^W ^C
```

h-type

Function A variation of the conventional H-type for use by internal sequences on the ES1553 or ES1561 modules, with only the first four command positions being decoded to control the four players connected to the module.

Generated by Four Disk Controller (FDC) software utility.

Format

SOH^{1}	Type^{2}	Header$^{3\text{-}12*}$	STX^{13*}	Command Block$^{14\text{-}21*}$	ETB^{22*}	ETX^{23*}
^A	**h**	*(see text)*	**^B**	*c1d1 c2d2 c3d3 c4d4*	**^W**	**^C**
01	68		02		17	03

Header Refer to conventional H-type (page I-16).

Command Block Between 1 and 4 two-byte values with each pair representing a command for one player (see table commencing page I-17). Each byte pair is position-dependent relative to the start of the Command Block:

c1d1 = player 1 *[ES1553 & ES1561]*
c2d2 = player 2 *[ES1553 & ES1561]*
c3d3 = player 3 *[ES1553 only]*
c4d4 = player 4 *[ES1553 only]*

Any unused / uncontrolled players must have the Null command 00 in the relevant position(s). Any Null byte-pairs after the last *controlled* player may be omitted.

R-type

Function Remote control of application programs.

Generated by Transmittable comments, plus the Show Start Routine of ES1553, ES1554 & ES1561 modules (see page I-26).

Format

SOH^{1}	Type^{2}	Header$^{3-??*}$	STX$^{??*}$	Command Block$^{??-??*}$	ETB$^{??*}$	ETX$^{??*}$
^A	**R**	*(see text)*	**^B**	*c1d1 c2d2 ..... c12d12*	**^W**	**^C**
01	52		02		17	03

Header Refer to Command Block for where used and format.

Command Block Between 1 and 12 two-byte values with each pair representing a command (see table opposite) for one unit. Each byte pair is position-dependent relative to the start of the Command Block:

c1d1 = unit 1 *(default and master)*
c2d2 = unit 2
c12d12 = unit 12.

Any unused / uncontrolled units must have the Null command 00 in the relevant position(s). Any Null byte-pairs after the last *controlled* unit may be omitted.

Command Pair		Function	Header Contents
ASCII	**Hex**		
/ /	2F 2F	Null - no change	*not used*
01	30 31	Transmission Control	**0** = Turn Ring Tx off **1** = Turn Ring Tx on
02	30 32	Run Control *(of currently loaded show)*	**0** = Stop show **1** = Run show **2** = Continue show
03	30 33	Release Cue *(ignore any remaining delay for the current cue and then execute it)*	*not used*
04	30 34	Specify New Show Name *(show is not loaded or run)*	Show Filename (8 chars. max.) (*e.g.* **NEXTSHOW**)
05	30 35	Goto Line / Cue Number	A 5-digit decimal line or cue number (*e.g.* **00123**)
06	30 36	Goto Frame Number *(i.e. the equivalent time in the show)*	An 8-digit decimal frame number (*e.g.* **00102045**). The number may be preceded by an ASCII **H** to indicate a Hex value (*e.g.* **H00010A2E**).
07	30 37	Run Effect / Sub-routine *(within the currently loaded show)*	Effect Filename (8 chars. max.) (*e.g.* **EFFECT01**).
08	30 38	Load Show *(specified by 04 command)*	*not used*
09	30 39	Delete Current Show	*not used*
0 :	30 3A	Delete Current Effects	*not used*
0 ;	30 3B	Goto Effect *(goto first cue of named effect but do not run it)*	Effect Filename (8 chars. max.) (*e.g.* **EFFECT01**).
0<	30 3C	Stop Current Show	*not used*
0=	30 3D	Run Current Show	*not used (see page I-27).*
0>	30 3E	Continue Current Show	*not used*
0?	30 3F	Pause Current Show	*not used*

Show Start Routine

The Show Start routine that can be generated by ES1553, ES1554 and ES1561 modules comprises six separate R-type commands. This is to ensure correct operation is obtained regardless of variations in remote control capabilities between different application programs (and release versions).

For example, if a switch input is activated corresponding to SHOW04, the following sequence of R-types will be generated:

`^A R ^B 0< ^W ^C`	Stop Current Show
`^A R ^B 09 ^W ^C`	Delete Current Show
`^A R ^B 0: ^W ^C`	Delete Effects (if any)
`^A R SHOW04 ^B 04 ^W ^C`	Specify New Show Name
`^A R ^B 08 ^W ^C`	Load New Show
`^A R ^B 0= ^W ^C`	Run New Show

IMPORTANT NOTE

All six commands in the Show Start Routine are destined for the bus master (i.e. unit 1) which will be either an ES1561 Show Control Module or a PC/AT computer. The application program must, therefore, be set to Unit 1.

Special Format (start internal sequence)

A transmittable comment or remark cue in the application program can be used to generate a special format R-type command that will run an internal sequence on an ES1553 or ES1561 module. The recommended format is:

```
^A R SEQnn ^B 0= ^W ^C
```

where ***nn*** is the sequence number (01 to 17). Both modules actually ignore any leading characters or zeros in the header. Thus, to run sequence 2, both of the following commands would achieve the same result:

```
^A R SEQ02 ^B 0= ^W ^C
^A R 2 ^B 0= ^W ^C
```

PROGRAMMING HINT

Since any leading characters are ignored, you can use text descriptions to identify the sequence function, e.g. PLAY2, RUN2, HOME2, etc.

The run instruction '`0=`' is position-relative and corresponds to the Address setting of the module (up to 24 instead of the usual limit of 12). To ignore a module, the null instruction '`//`' is used. For example:

```
^A R SEQ02 ^B // // 0= ^W ^C
```

will run sequence 2 on the module at Address 3, but not address 1 and 2, whereas:

```
^A R SEQ02 ^B 0= // 0= ^W ^C
```

will run sequence 2 on both the modules at address 1 and 3, but not address 2.

r-type

Function A variation of the conventional R-type for controlling internal sequences from within an internal sequence.

Generated by Four Disk Controller (FDC) software utility.

Format The recommended format is:

```
^A r SEQnn ^B 0= ^W ^C
```

where ***nn*** is the sequence number (01 to 17). Both modules actually ignore any leading characters or zeros in the header, thus the following would achieve the same result:

```
^A r 1 ^B 0= ^W ^C
```

SU-type

Function For placing user defined messages or information on the LCD displays of ES1561 or ES1553 modules.

Generated by Four Disk Controller software utility or transmittable comments.

Format

SOH[1]	Type[2]	Header[3-??*]	STX[??*]	Text 1 [??-??*]	STX[??*]	Text 2 [??-??*]	ETB[??*]	ETX[??*]
^A	**S**	*tt n* **U** *f*	**^B**	*x y data*	**^B**	*x y data*	**^W**	**^C**
01	53		02		02		17	03

Header *tt* = a two-character code which identifies the unit type that is sending the command:

SP (53 & 50 Hex) = ES1553 Serial Control Module
SC (53 & 43 Hex) = ES1561 Show Control Module

n = message version number (currently always **1** (31 hex)).

U = the message sub-type (55 Hex).

f = a flag byte in which each bit is used as follows:

bit0 = 0	display on all units,
bit0 = 1	display only on sending unit.
bit1 = 0	enable text display,
bit1 = 1	revert to local display mode.
bit2 = 0	normal display,
bit2 = 1	dynamic scrolling.
bit3 = 0	overwrite existing display,
bit3 = 1	blank existing display first.
bit4	*ignored.*
bit5	*ignored.*
bit6 = 1	always set
bit7	*ignored.*

Text 1 & 2

Each Text block must take the format — *x y data*.

Although two Text blocks (or lines) are shown, any number of blocks may be sent provided that each block is preceded by a **^B** character and that the total byte length of the SU-type command does not exceed 120. It is also permissible to send a single block only or no blocks at all. In the latter case the **^B** character can be omitted.

x = horizontal display position (*i.e.* column number)
y = vertical display position (*i.e.* line number)

both have a range of values from 0 to 15 which are represented as follows:

0 to 9	ASCII **0** to **9**	(30 to 39 Hex)
10	ASCII **:**	(3A Hex)
11	ASCII **;**	(3B Hex)
12	ASCII **<**	(3C Hex)
13	ASCII **=**	(3D Hex)
14	ASCII **>**	(3E Hex)
15	ASCII **?**	(3F Hex)

data = an ASCII text string of up to 16 characters.

EXAMPLES:

Display the message ‘Running EASY Version 2.00’ on all modules (the flag byte *f* = 01001001 = ASCII ‘**I**’):

```
^A S SP 1 U I ^B00  Running EASY  ^B01  Version 2.00  ^W^C
```

Clear any messages from all displays and return them to local display mode (the flag byte *f* = 01000010 = ASCII ‘**B**’):

```
^A S SP 1 U B ^W^C
```

IMPORTANT NOTES:
Remember that a message will remain on the LCD Display until overwritten by another message or returned to local display mode. Avoid using SU-type commands during fast-moving sequences of shows.

QD-type

Function Requests an input status update from an ES1554 module (whose Input Response is set to ‘Poll’). On receipt of this command, the ES1554 will respond with a standard D-type command representing the current state of all sixteen switch inputs.

Generated by Transmittable comments only.

Format

SOH[1]	Type[2–3]	STX[4]	Unit Address[5]	ETB[6]	ETX[7]
^A	**QD**	**^B**	*u*	**^W**	**^C**
01	52 44	02		17	03

Unit Address An ASCII digit **1** to **6** (31 to 36 Hex) which identifies the address of the ES1554 module to be interrogated.

EXAMPLE:

To interrogate the input status of the ES1554 module set to address 3, send the following:

```
^A QD ^B 3 ^W ^C
```

Assuming that inputs 1 to 8 are active and 9 to 16 are inactive, the module will respond with the following:

```
^A D 000 ^B ? ? 0 0 ^W ^C
```

(Refer to page I-4 for further details on the D-type command format.)

Z-type

Function Free-format data transmision to ES1553 and ES1561 serial control ports.

Generated by Transmittable comments only.

Format

SOH^{1}	Type^{2}	Header$^{3-??*}$	STX$^{??*}$	Command Block$^{??-??*}$	ETB$^{??*}$	ETX$^{??*}$
^A	**Z**	*(see text)*	**^B**	*(see text)*	**^W**	**^C**
01	5A		02		17	03

Header This defines which serial port(s) the command block is destined for by using one or more of the following ASCII characters:

1 (31 Hex) = Serial Port 1
2 (32 Hex) = Serial Port 2
3 (33 Hex) = Serial Port 3
4 (34 Hex) = Serial Port 4

Each character must be separated by an ASCII comma ($2C_H$).

If a **T** character (54 Hex) is placed at the end of the Header, the data in the Command Block will be interpreted as an ASCII text string; otherwise it will be interpreted as ASCII-encoded byte pairs.

If a U character (55 Hex) is placed before the T character, the text string will be transmitted in upper case only.

Command Block A string of ASCII values which comprise the free-format data to be transmitted.

EXAMPLES:

To transmit the data byte values ‘23 00 87 A3 F2’ to serial ports 1 and 2:

```
^A Z 1,2 ^B 23 00 87 A3 F2 ^W ^C
```

To transmit the same data byte values to serial ports 1, 3 and 4:

```
^A Z 1,3,4 ^B 23 00 87 A3 F2 ^W ^C
```

To transmit the text string “This is my TEXT string<CR>” to port 2 only:
(Note that ^J^M is the ASCII representation of a carriage return.)

```
^A Z 2T ^B This is my TEXT string^J^M ^W ^C
```

[*Transmitted resul*t = This is my TEXT String]

To transmit the same text string to all ports in upper case:

```
^A Z 1,2,3,4UT ^B This is my TEXT string^J^M ^W ^C
```

[*Transmitted resul*t = THIS IS MY TEXT STRING]

ASCII/Dec/Hex/Binary Cross-Reference

ASCII	Dec	Hex	Binary (bit map)							
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
^A	1	1	0	0	0	0	0	0	0	1
^B	2	2	0	0	0	0	0	0	1	0
^C	3	3	0	0	0	0	0	0	1	1
	4	4	0	0	0	0	0	1	0	0
	5	5	0	0	0	0	0	1	0	1
	6	6	0	0	0	0	0	1	1	0
	7	7	0	0	0	0	0	1	1	1
	8	8	0	0	0	0	1	0	0	0
	9	9	0	0	0	0	1	0	0	1
	10	A	0	0	0	0	1	0	1	0
	11	B	0	0	0	0	1	0	1	1
	12	C	0	0	0	0	1	1	0	0
	13	D	0	0	0	0	1	1	0	1
	14	E	0	0	0	0	1	1	1	0
	15	F	0	0	0	0	1	1	1	1
	16	10	0	0	0	1	0	0	0	0
^W	17	11	0	0	0	1	0	0	0	1
	18	12	0	0	0	1	0	0	1	0
	19	13	0	0	0	1	0	0	1	1
	20	14	0	0	0	1	0	1	0	0
	21	15	0	0	0	1	0	1	0	1
	22	16	0	0	0	1	0	1	1	0
	23	17	0	0	0	1	0	1	1	1
	24	18	0	0	0	1	1	0	0	0
	25	19	0	0	0	1	1	0	0	1

ASCII	**Dec**	**Hex**	**Binary (bit map)**							
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
	26	1A	0	0	0	1	1	0	1	0
	27	1B	0	0	0	1	1	0	1	1
	28	1C	0	0	0	1	1	1	0	0
	29	1D	0	0	0	1	1	1	0	1
	30	1E	0	0	0	1	1	1	1	0
	31	1F	0	0	0	1	1	1	1	1
	32	20	0	0	1	0	0	0	0	0
!	33	21	0	0	1	0	0	0	0	1
"	34	22	0	0	1	0	0	0	1	0
#	35	23	0	0	1	0	0	0	1	1
$	36	24	0	0	1	0	0	1	0	0
%	37	25	0	0	1	0	0	1	0	1
&	38	26	0	0	1	0	0	1	1	0
'	39	27	0	0	1	0	0	1	1	1
(	40	28	0	0	1	0	1	0	0	0
)	41	29	0	0	1	0	1	0	0	1
*	42	2A	0	0	1	0	1	0	1	0
+	43	2B	0	0	1	0	1	0	1	1
,	44	2C	0	0	1	0	1	1	0	0
-	45	2D	0	0	1	0	1	1	0	1
.	46	2E	0	0	1	0	1	1	1	0
/	47	2F	0	0	1	0	1	1	1	1
0	48	30	0	0	1	1	0	0	0	0
1	49	31	0	0	1	1	0	0	0	1
2	50	32	0	0	1	1	0	0	1	0
3	51	33	0	0	1	1	0	0	1	1
4	52	34	0	0	1	1	0	1	0	0
5	53	35	0	0	1	1	0	1	0	1

ASCII	**Dec**	**Hex**	**Binary (bit map)**							
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
6	54	36	0	0	1	1	0	1	1	0
7	55	37	0	0	1	1	0	1	1	1
8	56	38	0	0	1	1	1	0	0	0
9	57	39	0	0	1	1	1	0	0	1
:	58	3A	0	0	1	1	1	0	1	0
;	59	3B	0	0	1	1	1	0	1	1
<	60	3C	0	0	1	1	1	1	0	0
=	61	3D	0	0	1	1	1	1	0	1
>	62	3E	0	0	1	1	1	1	1	0
?	63	3F	0	0	1	1	1	1	1	1
@	64	40	0	1	0	0	0	0	0	0
A	65	41	0	1	0	0	0	0	0	1
B	66	42	0	1	0	0	0	0	1	0
C	67	43	0	1	0	0	0	0	1	1
D	68	44	0	1	0	0	0	1	0	0
E	69	45	0	1	0	0	0	1	0	1
F	70	46	0	1	0	0	0	1	1	0
G	71	47	0	1	0	0	0	1	1	1
H	72	48	0	1	0	0	1	0	0	0
I	73	49	0	1	0	0	1	0	0	1
J	74	4A	0	1	0	0	1	0	1	0
K	75	4B	0	1	0	0	1	0	1	1
L	76	4C	0	1	0	0	1	1	0	0
M	77	4D	0	1	0	0	1	1	0	1
N	78	4E	0	1	0	0	1	1	1	0
O	79	4F	0	1	0	0	1	1	1	1
P	80	50	0	1	0	1	0	0	0	0
Q	81	51	0	1	0	1	0	0	0	1

ASCII	**Dec**	**Hex**	**Binary (bit map)**							
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
R	82	52	0	1	0	1	0	0	1	0
S	83	53	0	1	0	1	0	0	1	1
T	84	54	0	1	0	1	0	1	0	0
U	85	55	0	1	0	1	0	1	0	1
V	86	56	0	1	0	1	0	1	1	0
W	87	57	0	1	0	1	0	1	1	1
X	88	58	0	1	0	1	1	0	0	0
Y	89	59	0	1	0	1	1	0	0	1
Z	90	5A	0	1	0	1	1	0	1	0
[	91	5B	0	1	0	1	1	0	1	1
\	92	5C	0	1	0	1	1	1	0	0
]	93	5D	0	1	0	1	1	1	0	1
^	94	5E	0	1	0	1	1	1	1	0
_	95	5F	0	1	0	1	1	1	1	1
`	96	60	0	1	1	0	0	0	0	0
a	97	61	0	1	1	0	0	0	0	1
b	98	62	0	1	1	0	0	0	1	0
c	99	63	0	1	1	0	0	0	1	1
d	100	64	0	1	1	0	0	1	0	0
e	101	65	0	1	1	0	0	1	0	1
f	102	66	0	1	1	0	0	1	1	0
g	103	67	0	1	1	0	0	1	1	1
h	104	68	0	1	1	0	1	0	0	0
i	105	69	0	1	1	0	1	0	0	1
j	106	6A	0	1	1	0	1	0	1	0
k	107	6B	0	1	1	0	1	0	1	1
l	108	6C	0	1	1	0	1	1	0	0
m	109	6D	0	1	1	0	1	1	0	1

ASCII	**Dec**	**Hex**	**Binary (bit map)**							
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
n	110	6E	0	1	1	0	1	1	1	0
o	111	6F	0	1	1	0	1	1	1	1
p	112	70	0	1	1	1	0	0	0	0
q	113	71	0	1	1	1	0	0	0	1
r	114	72	0	1	1	1	0	0	1	0
s	115	73	0	1	1	1	0	0	1	1
t	116	74	0	1	1	1	0	1	0	0
u	117	75	0	1	1	1	0	1	0	1
v	118	76	0	1	1	1	0	1	1	0
w	119	77	0	1	1	1	0	1	1	1
x	120	78	0	1	1	1	1	0	0	0
y	121	79	0	1	1	1	1	0	0	1
z	122	7A	0	1	1	1	1	0	1	0
{	123	7B	0	1	1	1	1	0	1	1
|	124	7C	0	1	1	1	1	1	0	0
}	125	7D	0	1	1	1	1	1	0	1
~	126	7E	0	1	1	1	1	1	1	0
	127	7F	0	1	1	1	1	1	1	1
	128	80	1	0	0	0	0	0	0	0
	129	81	1	0	0	0	0	0	0	1
	130	82	1	0	0	0	0	0	1	0
	131	83	1	0	0	0	0	0	1	1
	132	84	1	0	0	0	0	1	0	0
	133	85	1	0	0	0	0	1	0	1
	134	86	1	0	0	0	0	1	1	0
	135	87	1	0	0	0	0	1	1	1
	136	88	1	0	0	0	1	0	0	0
	137	89	1	0	0	0	1	0	0	1

ASCII	Dec	Hex	Binary (bit map)							
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
	138	8A	1	0	0	0	1	0	1	0
	139	8B	1	0	0	0	1	0	1	1
	140	8C	1	0	0	0	1	1	0	0
	141	8D	1	0	0	0	1	1	0	1
	142	8E	1	0	0	0	1	1	1	0
	143	8F	1	0	0	0	1	1	1	1
	144	90	1	0	0	1	0	0	0	0
	145	91	1	0	0	1	0	0	0	1
	146	92	1	0	0	1	0	0	1	0
	147	93	1	0	0	1	0	0	1	1
	148	94	1	0	0	1	0	1	0	0
	149	95	1	0	0	1	0	1	0	1
	150	96	1	0	0	1	0	1	1	0
	151	97	1	0	0	1	0	1	1	1
	152	98	1	0	0	1	1	0	0	0
	153	99	1	0	0	1	1	0	0	1
	154	9A	1	0	0	1	1	0	1	0
	155	9B	1	0	0	1	1	0	1	1
	156	9C	1	0	0	1	1	1	0	0
	157	9D	1	0	0	1	1	1	0	1
	158	9E	1	0	0	1	1	1	1	0
	159	9F	1	0	0	1	1	1	1	1
	160	A0	1	0	1	0	0	0	0	0
	161	A1	1	0	1	0	0	0	0	1
	162	A2	1	0	1	0	0	0	1	0
	163	A3	1	0	1	0	0	0	1	1
	164	A4	1	0	1	0	0	1	0	0
	165	A5	1	0	1	0	0	1	0	1

ASCII	Dec	Hex	Binary (bit map)							
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
	166	A6	1	0	1	0	0	1	1	0
	167	A7	1	0	1	0	0	1	1	1
	168	A8	1	0	1	0	1	0	0	0
	169	A9	1	0	1	0	1	0	0	1
	170	AA	1	0	1	0	1	0	1	0
	171	AB	1	0	1	0	1	0	1	1
	172	AC	1	0	1	0	1	1	0	0
	173	AD	1	0	1	0	1	1	0	1
	174	AE	1	0	1	0	1	1	1	0
	175	AF	1	0	1	0	1	1	1	1
	176	B0	1	0	1	1	0	0	0	0
	177	B1	1	0	1	1	0	0	0	1
	178	B2	1	0	1	1	0	0	1	0
	179	B3	1	0	1	1	0	0	1	1
	180	B4	1	0	1	1	0	1	0	0
	181	B5	1	0	1	1	0	1	0	1
	182	B6	1	0	1	1	0	1	1	0
	183	B7	1	0	1	1	0	1	1	1
	184	B8	1	0	1	1	1	0	0	0
	185	B9	1	0	1	1	1	0	0	1
	186	BA	1	0	1	1	1	0	1	0
	187	BB	1	0	1	1	1	0	1	1
	188	BC	1	0	1	1	1	1	0	0
	189	BD	1	0	1	1	1	1	0	1
	190	BE	1	0	1	1	1	1	1	0
	191	BF	1	0	1	1	1	1	1	1
	192	C0	1	1	0	0	0	0	0	0
	193	C1	1	1	0	0	0	0	0	1

ASCII	**Dec**	**Hex**	**Binary (bit map)**							
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
	194	C2	1	1	0	0	0	0	1	0
	195	C3	1	1	0	0	0	0	1	1
	196	C4	1	1	0	0	0	1	0	0
	197	C5	1	1	0	0	0	1	0	1
	198	C6	1	1	0	0	0	1	1	0
	199	C7	1	1	0	0	0	1	1	1
	200	C8	1	1	0	0	1	0	0	0
	201	C9	1	1	0	0	1	0	0	1
	202	CA	1	1	0	0	1	0	1	0
	203	CB	1	1	0	0	1	0	1	1
	204	CC	1	1	0	0	1	1	0	0
	205	CD	1	1	0	0	1	1	0	1
	206	CE	1	1	0	0	1	1	1	0
	207	CF	1	1	0	0	1	1	1	1
	208	D0	1	1	0	1	0	0	0	0
	209	D1	1	1	0	1	0	0	0	1
	210	D2	1	1	0	1	0	0	1	0
	211	D3	1	1	0	1	0	0	1	1
	212	D4	1	1	0	1	0	1	0	0
	213	D5	1	1	0	1	0	1	0	1
	214	D6	1	1	0	1	0	1	1	0
	215	D7	1	1	0	1	0	1	1	1
	216	D8	1	1	0	1	1	0	0	0
	217	D9	1	1	0	1	1	0	0	1
	218	DA	1	1	0	1	1	0	1	0
	219	DB	1	1	0	1	1	0	1	1
	220	DC	1	1	0	1	1	1	0	0
	221	DD	1	1	0	1	1	1	0	1

ASCII	**Dec**	**Hex**	**Binary (bit map)**							
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
	222	DE	1	1	0	1	1	1	1	0
	223	DF	1	1	0	1	1	1	1	1
	224	E0	1	1	1	0	0	0	0	0
	225	E1	1	1	1	0	0	0	0	1
	226	E2	1	1	1	0	0	0	1	0
	227	E3	1	1	1	0	0	0	1	1
	228	E4	1	1	1	0	0	1	0	0
	229	E5	1	1	1	0	0	1	0	1
	230	E6	1	1	1	0	0	1	1	0
	231	E7	1	1	1	0	0	1	1	1
	232	E8	1	1	1	0	1	0	0	0
	233	E9	1	1	1	0	1	0	0	1
	234	EA	1	1	1	0	1	0	1	0
	235	EB	1	1	1	0	1	0	1	1
	236	EC	1	1	1	0	1	1	0	0
	237	ED	1	1	1	0	1	1	0	1
	238	EE	1	1	1	0	1	1	1	0
	239	EF	1	1	1	0	1	1	1	1
	240	F0	1	1	1	1	0	0	0	0
	241	F1	1	1	1	1	0	0	0	1
	242	F2	1	1	1	1	0	0	1	0
	243	F3	1	1	1	1	0	0	1	1
	244	F4	1	1	1	1	0	1	0	0
	245	F5	1	1	1	1	0	1	0	1
	246	F6	1	1	1	1	0	1	1	0
	247	F7	1	1	1	1	0	1	1	1
	248	F8	1	1	1	1	1	0	0	0
	249	F9	1	1	1	1	1	0	0	1

ASCII	**Dec**	**Hex**	**Binary (bit map)**							
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*
	250	FA	1	1	1	1	1	0	1	0
	251	FB	1	1	1	1	1	0	1	1
	252	FC	1	1	1	1	1	1	0	0
	253	FD	1	1	1	1	1	1	0	1
	254	FE	1	1	1	1	1	1	1	0
	255	FF	1	1	1	1	1	1	1	1

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